

**SIEMENS**

# **ARCADIS Orbic**

**SP**

## **Replacements of Parts**

**System**

### **Replacement of Parts**

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## Required documents

- ARCADIS Orbic wiring diagram
- For the laser targeting device as applicable: Adjustment instructions/laser targeting device RXR2-130.032.01..

## Required tools, measurement devices, and accessories

**NOTE**

All tools, measurement devices, and accessories with the exception of those marked with a "\*" are listed along with their specifications in the STC (Service Tools Catalog).

---

- Standard tool kit\*
- Digital multimeter, e.g. Fluke 8060 APart no. 97 02 101 Y4290
- Oscilloscope > 50 MHz, e.g. Fluke Part no. 99 00 861 Y3155  
CombiScope PM 3390 A
- Dose measurement device
  - e. g. DALI PTW\* no longer in ARTD
  - or NOMEX PTW\* no longer in ARTD
  - or DIADOS PTW Part no. 97 17 612 Y0388
- Ground wire test meter
  - e.g. Unimed 1000 tester Part no. 51 38 727 Y0766
- 1 set of resolution tests e.g. part no. 28 71 820 RE999
- 1 set of radiation filters e.g. part no. 97 98 596 G5321
- Centering cross e.g. part no. 96 60 051 RE999
- WPS heat conducting paste e.g. part no. 20 48 650 SRN 6400
- 200 N spring scale e.g. part no. 44 15 113 RH090
- Torque wrench 20 Nm to 100 Nm e.g. part no. 80 86 159 RE999
- Optimol Viscogen KL 300, 50 ml Part no. 72 79 107
- Sealing compound\* Part no. 20 49 716 SRN 6002

## Text emphasis



**DANGER** indicates an immediate danger of death or serious physical injury.

⇒ n.a.



**WARNING** indicates a danger that may lead to death or serious physical injury.

⇒ n.a.



**CAUTION** used with the safety alert symbol indicates a risk of minor or moderate physical injury and/or damage to property.

⇒ n.a.



**NOTICE** used without the safety alert symbol indicates a risk that if disregarded will lead or may lead to a situation which may result in an undesirable result or state other than death, physical injury or damage to property.

⇒ n.a.



**NOTE** contains information provided with special emphasis to facilitate proper use of the equipment or proper execution of a procedure, i.e. hints, tips.

## Symbols



Checks and adjustments that must be performed with radiation ON are identified by the radiation warning symbol.



This symbol means "Dangerous voltage".



This symbol means "Attention, refer to the documentation".



This symbol indicates components sensitive to electrostatic discharge (ESD).

## Service, shutdown, hibernation, handover to the customer



**WARNING** Switch off via hibernation (version VB13C and higher) after service or before handover to the customer is not sufficient.

Various error messages can appear after the next system boot and configuration changes are not adopted.

- ⇒ For correct saving of the changed configurations, a shutdown must be performed. Shut down the system via the upper monitor menu bar <Options>-<End Session>-<Shut Down System> and then press the off key on the monitor trolley.
- 



**NOTE** Before system handover to the customer, the system has to be shut down via the menu bar <Options>-<End Session>-<Shut Down System>.

Switch off via hibernation (on/off button on the monitor trolley) is not sufficient.

---

## Safety information and protective measures

### General safety information (in existing documents)



**Danger of injury, death, or material damage.**

**Non-compliance can lead to death, injury, or material damage.**

**Please note:**

- ⇒ The product-specific safety information in these instructions,
  - ⇒ The general safety information in TD00-000.860.01... and
  - ⇒ The safety information in accordance with ARTD Part 2.
- 

### General electrical safety information



**Electrical safety!**

**Non-compliance can lead to severe injury or even death, as well as material damage.**

- ⇒ Parts under electrical voltage are accessible when the covers are open. To avoid danger, disconnect the system from the power supply before opening the covers. Disconnect the power plug.
  - ⇒ If an uninterruptible power supply (UPS) is installed in the system, the voltage output of the UPS must also be deenergized or the voltage output plug must be disconnected.
  - ⇒ If work steps must be performed using electrical power, the general safety information according to TD00-000.860.01... must be observed.
- 



**Electrical voltage!**

**Non-compliance can result in material damage.**

- ⇒ When working on the system, ESD regulations must be observed.
-

## Radiation safety information



### X-ray radiation!

Non-compliance can lead to illness, irreversible damage to body cells and the genotype, severe injury and even death.

During work on the system in which radiation must be released, the radiation protection directives and the rules for radiation protection according to ARTD-002.731.02... must be complied with.

Please note:

- ⇒ Use available radiation protection devices.
- ⇒ Wear radiation protection clothing (lead apron).
- ⇒ Stay as far away as possible from the radiation source.
- ⇒ Release radiation only if necessary.
- ⇒ Set the radiation activity as low as possible. (Low kV and mA values, short radiation time)
- ⇒ Release radiation for as short a time as possible.
- ⇒ Checks requiring the release of radiation are identified by the radiation warning symbol shown on the left.



## Mechanical safety information



### Risk of burns from hot parts or components!

If not observed, minor to more severe burns, especially on the hands, can occur.

- ⇒ Parts and components (e.g., power components, cooling fin, electromagnetic brakes) that can exceed 50 degrees Celsius during operation are accessible after the covers are opened. To avoid burns, switch the system off before touching parts or components and allow at least 5 minutes for it to cool down.

**⚠ CAUTION****Risk of injury from mechanical parts!**

If not observed, minor to more severe injury, especially to the hands, can occur.

- ⇒ The C-arm of the system is manufactured from a carbon fiber composite material. If the carbon fiber structure is damaged, by collision, cuts or scrapes by tools, etc., individual carbon fibers or carbon fiber bundles can protrude and injure the skin or penetrate the tissue of the hand upon contact.
  - ⇒ Before starting work on the C-arm, make sure that the carbon fiber structures are undamaged (visual inspection).
  - ⇒ If smaller superficial damage is detectable in the painted area or in the area of the running surface edges of the C-arm, wear work gloves and remove any protruding carbon fibers. Then carefully sand the damaged areas flat with fine emery cloth and seal the damaged surface with paint. For this, a spray lacquer in the color of the C-arm may be used (see Service Tool Catalogue).
  - ⇒ Remove any carbon fibers lying in the C-arm profile with a damp sponge or cloth.
  - ⇒ If greater damage to the carbon fiber structure indicating general or large-scale destruction of the carbon fiber structure (e.g., crack formation or flaked-off places on the running surfaces with torn carbon fibers) can be detected, replace the C-arm.
- 

**⚠ CAUTION****Risk of injury from mechanical parts!**

If not observed, minor to more severe injury, especially to the hands, can occur.

- ⇒ After the covers are opened, parts such as flat plugs, threaded bolts, cut-off cable ties and component edges are exposed, and if care is not taken, they can cause crushing, scrapes and cuts to the skin, particularly to the hands.
  - ⇒ Perform the required work with special care and attention to detail.
  - ⇒ If necessary, wear work gloves.
-

## Safety information - risk of infection



### Risk of infection due to pathogens!

Non-compliance can lead to severe injury and even death.

- ⇒ This product can be contaminated with infected blood or other bodily fluids.
- ⇒ Avoid all contact with blood or other bodily fluids!
- ⇒ Strictly observe the safety information in ARTD-002.731.37... regarding prevention of infectious diseases during customer service calls.

## Laser light localizer option



### Laser emissions!

This product contains class 2 lasers. (USA: Laser class 2)

Disregarding safety precautions can lead to bodily injury, especially to the retina of the eye, resulting in irreversible damage to vision.

- ⇒ Observe the safety information in ARTD-002.731.03... When working with the laser light localizer, do not look directly into the laser beam.



### Laser emissions!

There is no direct hazard to the eye (blinking reflex). Nevertheless, do not look directly into the laser beam.

## Information on the protective conductor resistance test

Observe the instructions in the "Safety Rules for Installation and Repair" (ARTD-002.731.17 ...).

The protective conductor resistance must be measured after every intervention in the system.

However, documentation of the measured values is required only during periodic safety checks.

If parts or components that can significantly influence the protective conductor resistance (e.g., replacement of the power cable, replacement of the power-up module, replacement of multi-pole connection cables that also create the protective conductor connection between system parts [e.g., monitor cable or C-arm cable]) are replaced or if protective conductor connections have been repaired, the protective conductor resistance must be

measured. The values must be documented and assessed in the protective conductor resistance report.

**NOTE**

**For evaluation purposes, the first measured value and the values documented during previous maintenance or safety checks must be compared to the measured values. A sudden or unexpected increase in the measured values may indicate a defect in the protective conductor connections - even if the limit value of 0.2 ohms is not exceeded. (Protective conductor or contacts).**

The measurement must be performed in accordance with DIN VDE 0751, Part 1 (refer to ARTD Part 2). The protective conductor resistance for all touchable conductive parts must be measured during the normal operating state of the system.

Make sure that control cables or data cables between the components of the system are not mistaken for protective conductor connections.

During the measurement, the power cable and additional connection cables that also create the protective conductor connection between system parts (e.g. monitor cable between the basic unit and monitor trolley) must be moved section by section to detect cable breaks.

The protective conductor resistance must not exceed 0.2 ohms.

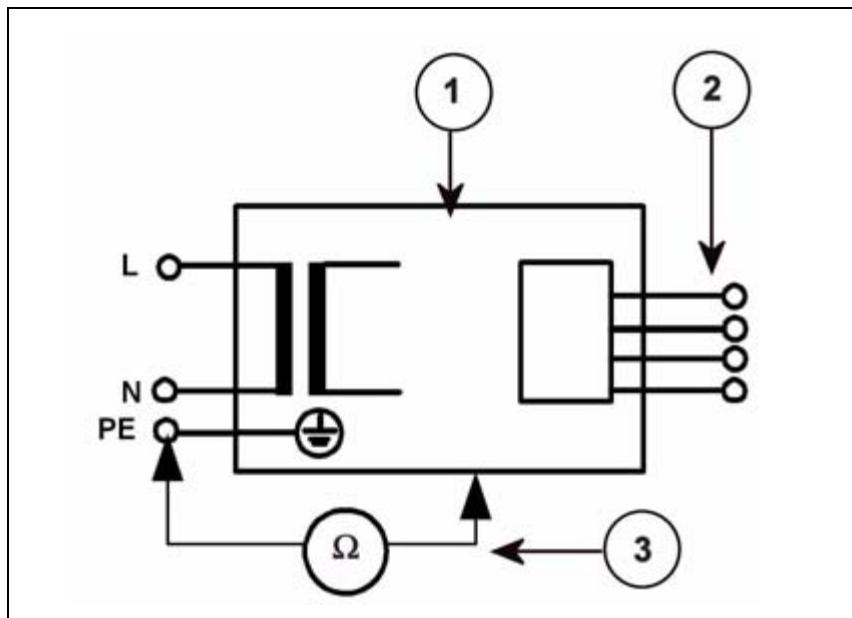


Fig. 1: Measuring circuit for measuring the protective conductor resistance for units that are

*disconnected from power, in compliance with DIN VDE 0751-1/2001-10, Fig. C2.*

- |        |  |
|--------|--|
| Pos. 1 | = System   |
| Pos. 2 | = Application part type B (if available)               |
| Pos. 3 | = Measurement setup (integrated into measuring device) |

## System leakage current measurement information

**NOTE**

If parts in the primary circuit (e.g. power cable, line filter, power transformers, or complete ON/OFF assemblies) are replaced during service work, the system leakage current measurement must be subsequently performed and recorded as a repeat measurement.

However, the first measured value must be newly determined and a new protocol be created under the following conditions:

- Lack of system leakage current measurement documentation.
- When local line voltage or line frequency deviates from the line voltage and line frequency values documented in the protocol (e.g., in the event of a site/operator change)
- When a different procedure for measuring the system leakage current than the one documented in the protocol is used.

For the purpose of traceability, reference to the new protocol must be written in the old protocol. The reason for newly determining the first measured value must be documented and confirmed with a name and signature.

---

Observe the instructions in the "Safety Rules for Installation and Repair" (ARTD-002.731.17...).

**WARNING****Electrical voltage!**

**Non-compliance can lead to severe injury and even death.**

- ⇒ The system leakage current measurement may be performed on systems of protection class I only after the protective conductor test has been passed.

**First measured value**

The first measured value was already determined and documented in the system leakage current protocol. The measuring procedure was also recorded.

The measurement was performed with the recorded line voltage, line frequency and with the recorded measuring equipment.

**Measurement**

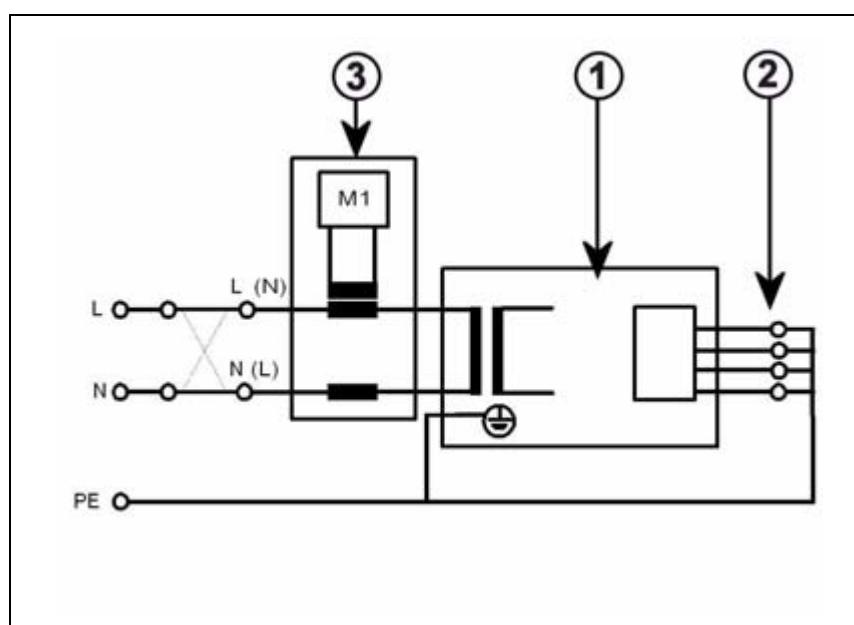
Perform the measurement in accordance with DIN VDE 0751, Part 1 (see ARTD-002.731.17...), and record the value determined.

The measuring procedure indicated in the protocol must be used.

If the first measured value has to be newly determined (see previous information), a measuring procedure can be selected (direct measurement or differential measurement).

Measurement of the system leakage current according to the differential current method (measurement setup according to ([Fig. 2 / p. 16](#)) must be given preference, since this method is not dangerous to the person performing the measurement and other persons.

However, please note the minimum resolution of the system leakage current measuring instrument and any additional manufacturer's data restricting the use of the measuring device.

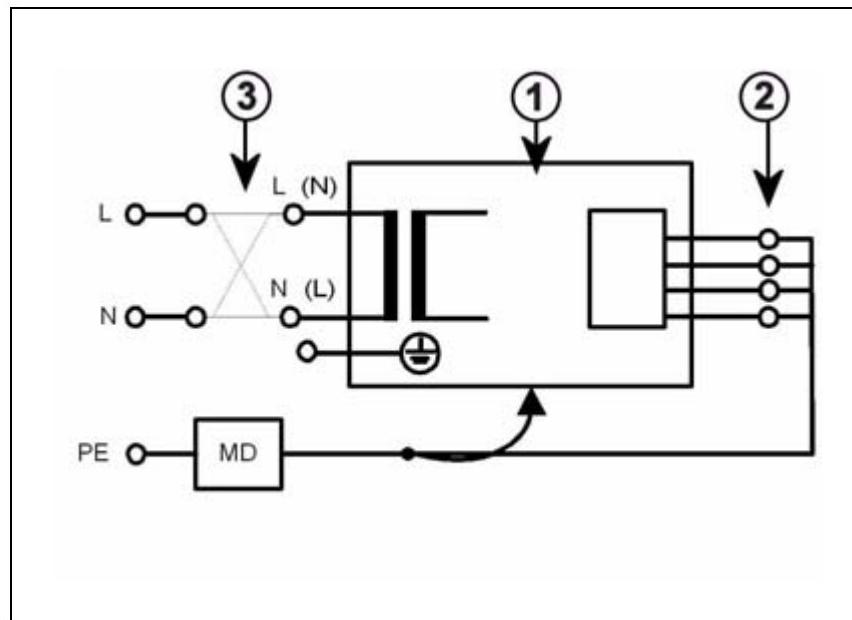


*Fig. 2: Measuring circuit for measuring the system leakage current according to the differential*

*current method in compliance with DIN VDE 0751-1/2001-10, Fig. C6 for protection class I.*

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

If the direct measurement of the system leakage current is used (measurement setup according to (Fig. 3 / p. 17)), the system must be insulated during the measurement and must not be touched.



*Fig. 3: Measuring circuit for direct measurement of the system leakage current in compliance with DIN VDE 0751-1/2001-10, Fig. C5 for protection class I.*

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

**WARNING****Electrical voltage!**

Non-compliance can lead to severe injury and even death.

- ⇒ No housing parts of the system may be touched during direct measurement of the leakage current (measurement setup according to (Fig. 3 / p. 17)).
  - ⇒ Third-person access to the system must be prevented.
- 

The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.

Enter the highest value in the system leakage current protocol.

This value must not exceed the permissible leakage current values according to DIN VDE 0751-1/2001-10, Table F.1, row "system leakage current for units according to remarks 1 and 3" of

2.5 mA.

Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This must also be documented.

Document the measuring procedure (differential measurement or direct measurement) and the measuring device used (designation and serial number).

In the case of repeat measurements, the measured value must also be evaluated.

**NOTE**

For evaluation purposes, the first measured value and the values documented during previous maintenance or safety checks must be compared to the measured values. A sudden or unexpected increase in the measured values may indicate that a fault has occurred in the primary power supply circuit (insulation damage, damage from moisture, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.

---

The evaluation is not necessary in the case of a new determination.

File the protocol sheet in the system binder or log book.

## Information on optionally installed navigation systems

This ARCADIS system can be used in combination with navigation systems supplied by various navigation system manufacturers.

The use of the navigation system lies within the responsibility of the customer.

Some service tasks can affect the accuracy of the navigation system.



**Some service tasks performed on the ARCADIS system will lead to inaccuracy in a navigation system installed optionally.**

**Failure to take the necessary steps to address this situation can lead to severe injuries in the patient.**

⇒ If service tasks are performed on the ARCADIS system which can affect the accuracy of installed navigation systems (see list below), the customer must be notified verbally and/or in writing that the accuracy of the installed navigation system is no longer guaranteed if such service tasks have been performed, and that the accuracy of the navigation system must be checked and certified before it is used again.

Service tasks that can affect the accuracy of an installed navigation system:

- All work steps that affect the geometry of the C-arm and its components, such as:
  - ⇒ Removing or installing the I.I.
  - ⇒ Removing or installing the I.I. housing
  - ⇒ Removing or installing the I.I. mounting ring on the I.I.
  - ⇒ Removing or installing the I.I. grid
  - ⇒ Removing or installing the I.I. optics
  - ⇒ Removing or installing the CCD camera
  - ⇒ Removing or installing any mechanical components of the C-arm
- Any adjustments that alter the geometry of the imaging components, such as:
  - ⇒ Adjustment of camera optics (optical sharpness, image size)
  - ⇒ Adjustment of camera rotation (positioning with respect to I.I. optics)
  - ⇒ Adjustment of I.I. geometry and sharpness (I.I. mini voltage supply)
- Any subsequent installation of released options that affect the geometry of the C-arm and its components, such as:
  - ⇒ Integrated laser light localizer option (geometric alteration)
  - ⇒ I.I. laser light localizer option (weight alteration)
  - ⇒ 2D Navigation Option (Attachment of altered mounting ring to I.I.)

## Covers



### Electrical voltage!

See chapter 1, Safety Information.

- ⇒ Disconnect the line voltage plug prior to removing the covers.
- 

## Main system, rear cover

### Removing the rear cover

1. Engage the foot brake.
2. Remove the screws from the rear cover.
3. Pull the cover back approximately 25 cm.
4. Unscrew the ground wire from the cover panel.
5. Pull the cover completely off and tilt it down.
6. Lift up the cover and raise both lateral metal brackets from the guide rails.

### Installing the rear cover

1. Fit the lateral metal brackets back into the guide rail.
2. Reattach the ground wire to the rear cover.
3. Lift the cover and push it forward. Be careful with the EMC spring contact.
4. Reattach the cover and tighten the screws.

## Main system, horizontal carriage cover

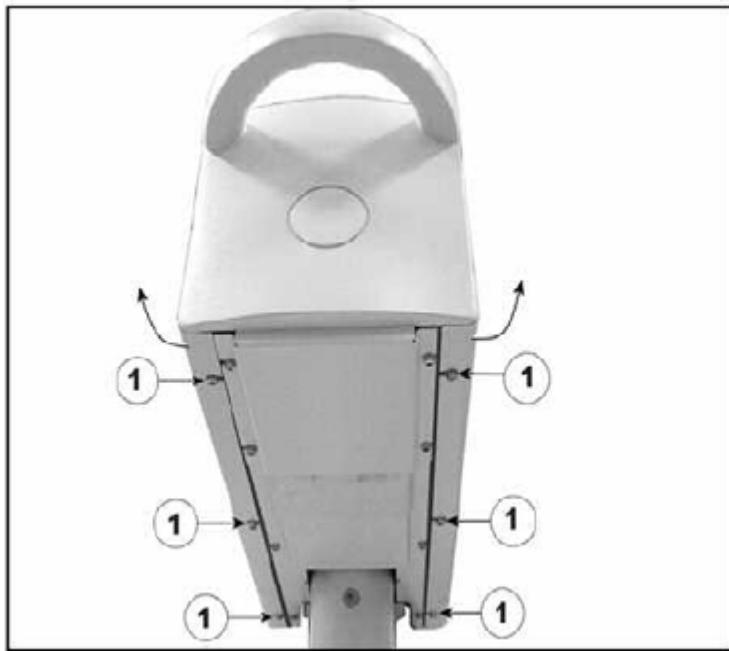


Fig. 4: Cover 1

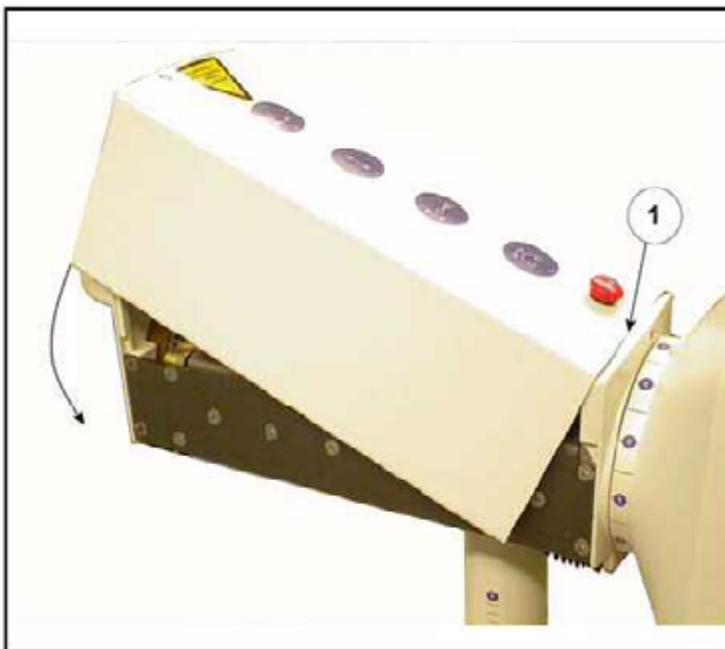


Fig. 5: Cover 2

### Removing the cover



#### Danger of injury when dismantling/assembling mechanical parts!

**Noncompliance can lead to minor to moderately severe injury, especially to the hands!**

- ⇒ The horizontal carriage cover is bent in a U-shape and must be pulled on the side toward the outside when it is removed.
- ⇒ The cover is then under mechanical stress.
- ⇒ We recommend wearing light work gloves to avoid injuries.

1. Loosen the 6 mounting screws ([\(1/Fig. 4 / p. 21\)](#))
2. Expand the cover at the rear end in the direction of the arrow (see ([Fig. 4 / p. 21](#))) and remove it in a downward direction.
3. If necessary, disconnect the ground wire, the keypad (brake buttons) cable, and the emergency stop button cable.

### Installing the cover



#### Danger of injury when dismantling/assembling mechanical parts!

**Noncompliance can lead to minor to moderately severe injury, especially to the hands!**

- ⇒ When the cover is attached and pressed down, it is under mechanical stress and snaps into place over the bottom edge of the horizontal carriage.
- ⇒ Expand the cover at the rear end(see ([Fig. 4 / p. 21](#))) far enough that, as shown in ([Fig. 5 / p. 21](#)), it lies obliquely over the horizontal carriage in the edge, ([\(1/Fig. 5 / p. 21\)](#)).
- ⇒ Press on the top surface of the cover, without grasping the sheet metal edges, until this slides over the lower edge of the horizontal slide.

1. Re-fasten or connect the ground wire, the keypad (brake buttons) cable, and the emergency stop button cable.
2. Expand the cover at the rear end (see ([Fig. 4 / p. 21](#))) far enough that, as shown in ([Fig. 5 / p. 21](#)), it lies obliquely over the horizontal carriage in the edge, ([\(1/Fig. 5 / p. 21\)](#)).
3. Press on the top surface of the cover, without grasping the sheet metal edges, until this slides over the lower edge of the horizontal slide. Make sure that the cover does not slide out from the edge ([\(\(1/Fig. 5 / p. 21\)\)](#).
4. Check operation of the emergency stop button and of the brake buttons.
5. Fasten the cover with the 6 Allen screws ([\(\(1/Fig. 4 / p. 21\)\)](#).

## 6. MODULARIS only:

- The tightening force of the docking plate of 18 Nm must be observed (see service instructions for MODULARIS)

## Main system, SIREPHOS cover

**NOTE**

The SIREPHOS is surrounded by a C-arm cover to adapt it to the form of the C-arm. This cover is sealed all around with a sealing compound (20 49 716) to prevent any contamination of the unit by the SIREPHOS or the C-arm.

### Removing the SIREPHOS cover

1. Loosen the 4 cover screws of the surrounding C-arm housing.
2. Use a sharp knife to cut open the sealing compound all the way around the cover.
3. Lift off the C-arm cover. The 3 cover screws of the SIREPHOS cover are now accessible.
4. Remove the sealing compound residue from the C-arm cover, the SIREPHOS cover and the C-arm.
5. Loosen the 3 cover screws of the SIREPHOS cover.
6. Lift off the cover.

### Attaching the SIREPHOS cover

1. On completing service, place the SIREPHOS cover on the SIREPHOS.
2. Refasten the SIREPHOS cover with the 3 cover screws.
3. Reattach the C-arm cover and seal it all around with sealing compound.
4. Use a paper towel to wipe off excess sealing compound.
5. Refasten the C-arm cover with the 4 cover screws.

## Main system, C-arm covers



### Risk of injury!

Noncompliance can lead to minor to medium injury and/or property damage.

- ⇒ The C-arm covers contain counterbalance weights and weigh approx. 6 kg.
- ⇒ Hold the covers firmly when installing or removing them.
- ⇒ Before the C-arm cover is loosened, the C-arm must be moved to its middle orbital position.
- ⇒ If the C-arm covers are loosened, the C-arm may not be moved to its orbital end positions (I.I. or SIREPHOS at the orbital end position).

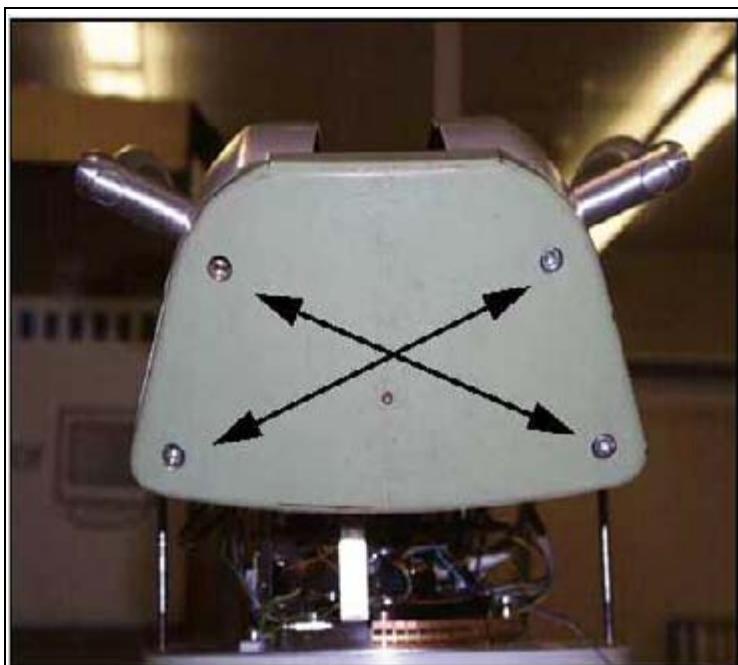


Fig. 6: Cover 3

### Removing the C-arm covers

1. Move the C-arm to its middle orbital position
2. Remove the 4 mounting screws (([Fig. 6 / p. 24](#))).
  - ⇒ Hold the covers firmly while removing them.

## Installing the C-arm covers

1. Install them using the same procedure in the reverse order.

## Monitor trolley, cover panels

### Removing the cover panels

1. Remove the 4 screws from the middle back cover to access the imaging system (rear).
2. Remove the upper back cover plate of the log book compartment.
3. Remove the lower back cover to access the power supply.
4. Remove the front cover to access the imaging system (front).

### Installing the cover panels

1. Install the covers in reverse order.

## Concluding steps

**NOTE**

**Observe the guidelines on the protective conductor test and the leakage current measurement in this chapter.**

---

- If necessary, perform the leakage current measurement.
- After completing all work steps and closing all the cover panels, perform the protective conductor test in accordance with ARTD-002.731.17...
  - ⇒ The protective conductor resistance must not exceed 0.2 ohms.

## D1 control board



### Electrical voltage!

See chapter 1, Safety Information.

- ⇒ Make sure that LED V400 on the D2 board is off prior to performing any work on boards D1 and D2. This should occur approximately 3 minutes after switching OFF the ARCADIS system.

## Replacement and additional work steps

1. Make sure that a current backup of the main system is available.
2. Read out the load counter of the Sirephos (path: <Service>-<Main System>-<Adjustment>-<Load Counter>).
3. Document this value because it is necessary for a Sirephos replacement. If the D1 is defective, the load count is available in the offline report (path:<Service>-<Reports>-<Main System>-<Configuration Offline>).
4. Disconnect and replace the D1 board.
5. Install the new D1 board and reconnect all cable connections. Ensure that the shielding and ground wire connections are connected correctly.
6. Set the jumpers and switches according to the wiring diagram.
7. Perform the download procedure for the D1 control board (path: <Service>-<Main System> -<Download>-<C-Arm>).

### NOTE

If the EE-PROM of the replacement D1 is not completely deleted, it will be cleared automatically after the host software has been downloaded. The delete procedure is indicated as "d" on the 7-segment display and requires approximately 5 minutes. During the delete procedure, do not switch off the system or perform additional programming. After successful deletion, the 7-segment display returns to the normal status display.

8. After download, wait for the system to reboot.

### NOTE

With software version VB11A, the system serial number (20xxx) must be entered and saved manually under <Main System>-<Configuration>-<Main System> before a restore of the main system is carried out.

9. Restore the main system parameters (path: <Service>-<Backup & Restore> "Packages" - "Main System").
10. Perform a generator adjustment (path: <Service>-<Main System>-<Adjustment>-<Generator Adjust.>).

11. Check the dose rate control and adjust it as necessary (path: <Service>-<Main System>-<Adjustment>-<Dose Rate>).
12. Ensure that camera rotation is functioning properly. Adjust it, if necessary.
13. Ensure that the collimator is functioning properly. Adjust it, if necessary.
14. Check the display functions and the setting of the blades on the monitor. Adjust it, if necessary.
15. Ensure that the area dose measurement device (if present) is functioning correctly.
16. Test the FL/PFL/DR and direct exposure functions of the system.

**⚠️WARNING**

**When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed. See the chapter "Prerequisites," section "Safety information and protective measures."**

⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## D2 power board



**Electrical voltage!**

See chapter 1, Safety Information.

⇒ Make sure that LED V400 is off prior to performing any work on boards D1 and D2. This should occur approximately 3 minutes after switching OFF the ARCADIS system.

1. Disconnect the D1 and D2 boards completely.
2. Disconnect the cables between boards D1 and D2.
3. Remove boards D1 and D2.
4. Apply heat conducting paste to the heat sink for the power semiconductor on the new D2 board.
5. Reinstall boards D2 and D1 and reattach all connections.
6. Ensure that the shielding and ground connections are positioned correctly.
7. Perform the kV offset adjustment and the generator adjustment (filament learning).
8. Test the FL/PFL/DR and direct exposure functions, if there is a cassette holder.

## D3 interface board

**Electrical voltage!**

See chapter 1, Safety Information.

⇒ **Switch system power supply off and disconnect the power plug.**

1. Replace the D3 interface board.
2. Check the +26.75 V voltage for the I.I. mini-voltage supply. Adjust it, if necessary.  
Refer to chapter 3 of these instructions, Checking the Operating Voltages.
3. Check the radiation release/format switchover/vertical column movement functions.

## D40 board for downward movement of the lifting column



**WARNING**

**Electrical voltage!**

See chapter 1, Safety Information.

⇒ **Switch system power supply off and disconnect the power plug.**

1. Replace the D40 board.
2. Using the operating instructions for the basic system, check both the movements of the C-arm and the signal messages.

**M14 power supply, +5 V/+15 V/-15 V**

1. Replace the power supply.
2. Check the power supply voltage and adjust it if necessary. Refer to the chapter ([Voltages / p. 112](#)).

## M13 power supply 230V/13V

1. Replace the power supply.
2. Check the power supply voltage according to the chapter ([Voltages / p. 112](#)).

## I.I. mini-voltage supply



**Electrical voltage!**

See chapter 1, Safety Information.

- ⇒ Switch the system power supply off and disconnect the power plug.
- 



**Electrical voltage!**

See chapter 1, Safety Information.

- ⇒ Prior to removing the mini-voltage supply, the system must be switched off for at least 3 minutes, until the high voltage in the system and in the I.I. mini-voltage supply dissipates.
- 

### Roederstein I.I. mini voltage supply

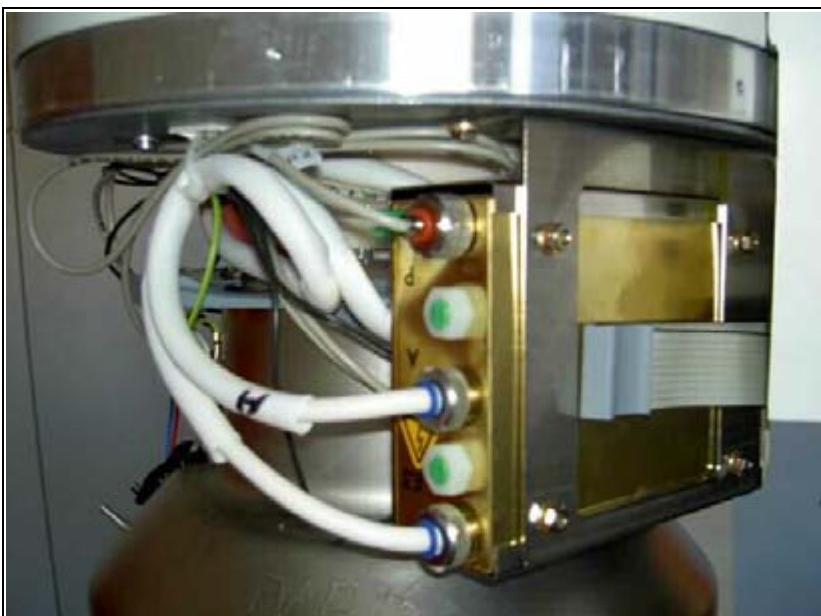


Fig. 7: I. I. mini-voltage supply

1. Remove the cylindric cover on the I.I..
2. Replace the I.I. mini-voltage supply (Fig. 7 / p. 34).
3. Refer to the I.I. test certificate 1 for the E1/E2/E3 and A voltages. Check and adjust them as necessary according to the "Voltages" chapter.
4. Check the functions and adjustments of the collimator. Readjust them, if necessary.
5. Check the display functions and the setting of the blades on the monitor. Adjust them, if necessary.

6. Check the overall resolution according to the IQ test.
7. Perform the IQ test.

**WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed. See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Spellman I.I. mini voltage supply



Fig. 8: 9 inch / 23 cm I.I. with Spellman I.I. mini power supply

- Pos. 1 Mounting screws  
Pos. 2 Plugs E1 to E3, Penning and anode  
Pos. 3 Ribbon cables  
Pos. 4 DIP switches  
Pos. 5 Test points

1. Remove the cover on the I.I.
2. Replace the I.I. mini-voltage supply.
3. Refer to the I.I. test certificate 1 for the E1/E2/E3 and A voltages. Check and adjust them as necessary according to the "Voltages" chapter.
4. Check the functions and adjustments of the collimator. Readjust them, if necessary.
5. Check the display functions and the setting of the blades on the monitor. Adjust them, if necessary.
6. Check the overall resolution according to the IQ test.
7. Perform the IQ test.

**⚠️WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Collimator

1. Replace the collimator.
2. Ensure that the collimator is functioning properly and is set correctly. If necessary, adjust it.
3. Ensure that the collimator blades of the iris diaphragm are visible during fluoroscopy in survey format and zoom format on at least 2 sides of the monitor image.
4. Check collimation for direct exposure if a cassette holder is being used.
5. Check the display of the blades on the monitor and adjust it if necessary.
6. Remove the old set of collimator labels near the SIREPHOS and attach the included new labels in the same position.
7. Check that the original collimator labels are the same as the new ones.

## Replacing the single tank

1. Read out and note the number of resets and the current load counts from the SIREPHOS tank. Path: <Service>-<Main System>-<Adjustment>-<Load Counter>.
2. Open the SIREPHOS cover. See chapter Prerequisites, Covers.
3. Remove the laser targeting device, if present.
4. Remove the dose measurement chamber, if present.
5. Remove the collimator.
6. Disconnect the SIREPHOS plug.
7. Remove the ground screw for the ground wire.
8. Remove the rubber stop of the C-arm on the SIREPHOS side. The screws that secure the SIREPHOS are now visible.
9. Remove the SIREPHOS screws. When doing this, have a second person hold the X-ray tube unit.
10. Place the new X-ray tube unit on the guide bolts and secure it with the two Allen screws.
11. Ensure that all cables are routed properly.
12. Reconnect the SIREPHOS plug and secure it.
13. Reconnect the ground wire using the ground screw.
14. Do not install the rubber stop yet.
15. Reinstall the collimator and connect it.
16. Reinstall the dose measurement chamber/laser targeting device and connect them.

**X-ray radiation!**

See chapter 1, Safety Information.

⇒ Protect against radiation exposure. Wear a lead apron.



17. Enter the new serial no. of the new single tank. Path: <Service>-<Main System>-<Configuration>-<Load Counter>.
18. Adjust the generator. Path: <Service>-<Main System>-<Adjustment>-<Generator Adjustment>.
19. Reset the load counter. Path: <Service>-<Main System>-<Adjustment>-<Load Counter>.
20. Ensure that the collimator is functioning properly and is set correctly.
21. Ensure that the collimator blades are centered in the blanking circle.
22. If possible, loosen the Sirephos screws slightly and tilt the SIREPHOS to adjust it.
23. Retighten the SIREPHOS screws.
24. Ensure that the collimator blades of the iris diaphragm are visible during fluoroscopy in the survey format and zoom format on at least 2 sides of the monitor image.
25. Check the display of the blades on the monitor screen and adjust it as necessary.
26. Check collimation for direct exposure if there is a cassette holder.
27. Reinstall the rubber stop.

28. Ensure that the area/dose product measurement device is functioning properly (if present).
29. Check the setting of the laser targeting device and adjust it as necessary according to the Adjustment Instructions for the Laser Targeting Device, RXR2-130.815.01.
30. Reattach the SIREPHOS cover.
31. Seal the SIREPHOS cover using sealing compound. See chapter Prerequisites, Covers.

## Replacing the camera and the I.I. optics (camera version ≥ 2.0)

**Relevant systems:** ARCADIS Orbic system serial no. > 20037; camera version ≥ 2.0 (see ID label).

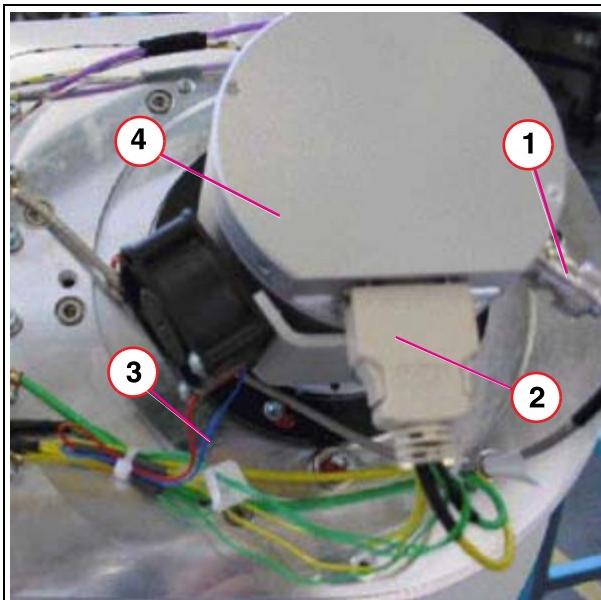


Fig. 9: II \_ Connection

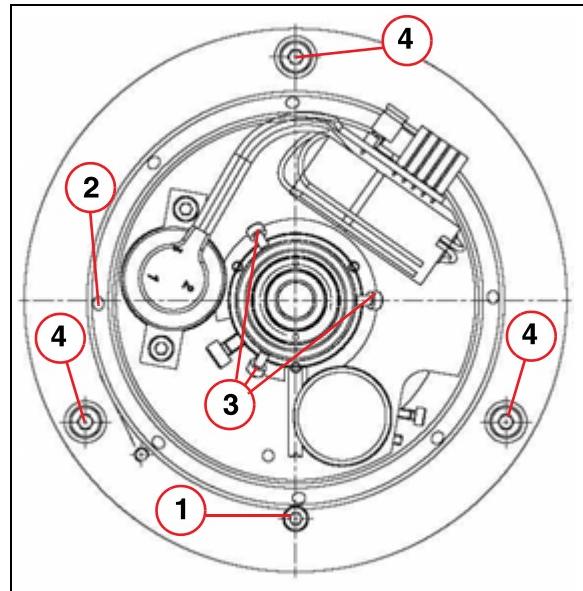


Fig. 10: Replacing the camera and I.I. optics

### Removing/replacing the camera

1. Switch the system off.
2. Remove the upper I.I. cover (already removed in (Fig. 9 / p. 40)).
3. Unplug the connectors (1/Fig. 9 / p. 40), (2/Fig. 9 / p. 40) and disconnect the fan wires (3/Fig. 9 / p. 40).
4. Loosen the clamping screw (1/Fig. 10 / p. 40).
5. Rotate the clamping ring (2/Fig. 10 / p. 40) a half rotation in the counterclockwise direction to loosen the camera. For this purpose, insert an Allen key (2.5 mm) into the hole (2/Fig. 10 / p. 40) and push the clamping ring in the counterclockwise direction.
6. Remove the 3 Allen screws (3/Fig. 10 / p. 40).
7. Turn the entire camera (4/Fig. 9 / p. 40) counterclockwise until it is no longer attached. For subsequent reinstallation, count the number of turns when removing the camera. The connector (2/Fig. 9 / p. 40) should be in the position shown in (Fig. 9 / p. 40).
8. Install the (new) camera in reverse order.
9. Adjust the camera and I.I. optics.
10. Perform the IQ test.
11. Complete the country-specific acceptance (§16 partial acceptance... /DHHS...).

 **WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Removing/replacing the I.I. optics

**Prerequisites:** Camera must already be removed.

1. Remove the 3 M4 screws (4/Fig. 10 / p. 40).
2. Remove the I.I. optics.
3. Install the (new) optics and camera in reverse order.
  - ⇒ When screwing in the 3 M4 screws (4/Fig. 10 / p. 40), make sure that the optic is pressed against the centering bolts.
4. Adjust the camera and I.I. optics.
5. Perform the IQ test.

 **WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Adjusting the camera and the I.I. optics (camera version ≥ 2.0)

**Relevant systems:** ARCADIS Orbic system serial no. > 20037; camera version ≥ 2.0 (see ID label).

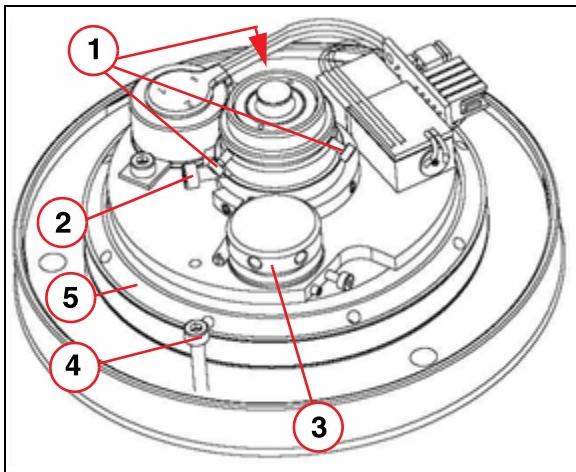


Fig. 11: Adjusting the camera

### Centering the camera

**NOTE**

The camera can be centered by moving the optics. Centering is performed in the factory and should be acceptable. The camera optics must be moved toward the centering bolts.

**WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

### Reproduction scale adjustment

**Prerequisites:** Camera centering should be OK.

1. Loosen the clamping screw (4/Fig. 11 / p. 42).
2. Loosen the lock ring (5/Fig. 11 / p. 42).
3. Unplug the connectors (1/Fig. 9 / p. 40), (2/Fig. 9 / p. 40) and disconnect the fan wires (3/Fig. 9 / p. 40).

4. Remove the 3 Allen screws from the camera flange (1/Fig. 11 / p. 42).
5. You can increase/decrease the image size by turning the entire camera. The camera plugs must not be in the same position.
  - ⇒ Turn clockwise = larger image
  - ⇒ Turn counterclockwise = smaller image
6. Rotate the camera until the plugs are at the same location as prior to the adjustment and retighten the 3 M2 Allen screws (1/Fig. 11 / p. 42).
  - ⇒ Tightening torque **14 ± 1Ncm**
7. Tighten the lock ring (5/Fig. 11 / p. 42).
8. Retighten the clamping screw (4/Fig. 11 / p. 42).
9. Reattach the connectors (1/Fig. 9 / p. 40), (2/Fig. 9 / p. 40) and the fan wires (3/Fig. 9 / p. 40).
10. Release fluoro and check the image size. Repeat the adjustment if necessary.
11. Open the service application and adjust the 0 degree position of the image.  
Path: <Service>-<Main System>-<Adjustment>-<Image Rotation>.
12. Perform the IQ test.



## **WARNING**

**When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.**

**See the chapter "Prerequisites," section "Safety information and protective measures."**

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## **Camera focus**

**Prerequisites:** Camera reproduction scale should be OK.



1. Loosen the focus ring clamping screw (2/Fig. 11 / p. 42).
2. You can adjust the optimum sharpness by turning the focus ring (3/Fig. 11 / p. 42).
3. Release fluoro and check the sharpness. Repeat the adjustment if necessary.
4. Retighten the focus clamping screw (2/Fig. 11 / p. 42).
5. Perform the IQ test.

## **NOTE**

**Adjusting the camera focus also has a slight effect on the reproduction scale. The reproduction scale adjustment may have to be repeated.**

**⚠️WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Replacing the camera and the I.I. optics (camera version < 2.0)

**Relevant systems:** ARCADIS Orbic system serial no. < 20038; or the camera was already replaced by the new camera version  $\geq 2.0$  (see ID label).

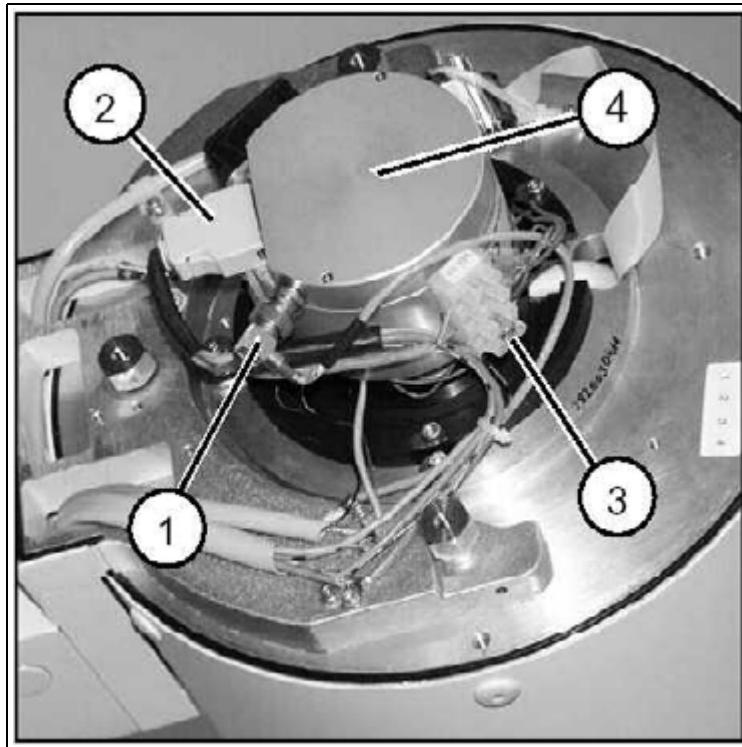


Fig. 12: Replacing the camera and the I. I. optics\_1

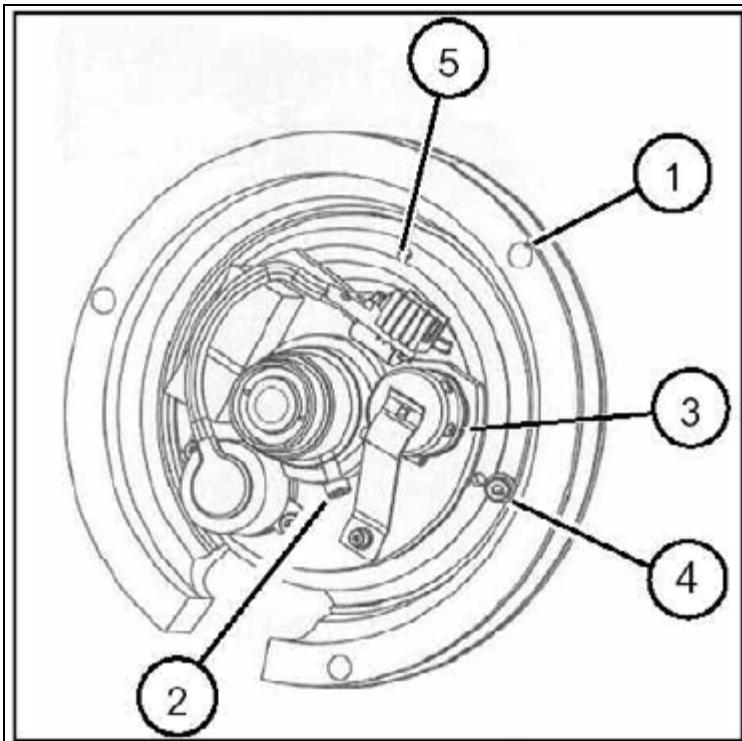


Fig. 13: Replacing the camera and the I.I. optics\_2

### Removing/replacing the camera

1. Remove the I.I. cover (already removed in (Fig. 12 / p. 45)).
2. Unplug the connectors (1/Fig. 12 / p. 45), (2/Fig. 12 / p. 45) and disconnect the fan wires (3/Fig. 12 / p. 45).
3. Loosen the clamping screw (4/Fig. 13 / p. 46).
4. Rotate the clamping ring (5/Fig. 13 / p. 46) a half rotation in the counterclockwise direction to loosen the camera. For this purpose, insert an Allen wrench (2.5 mm) into the hole (5/Fig. 13 / p. 46) and push the clamping ring in the counterclockwise direction.
5. Turn the entire camera (4/Fig. 12 / p. 45) counterclockwise until it is no longer attached. For subsequent reinstallation, count the number of turns when removing the camera. The connector (2/Fig. 12 / p. 45) should be in the position shown in (Fig. 12 / p. 45).
6. Install the (new) camera in reverse order.
7. Adjust the camera and I.I. optics.
8. Perform the IQ test.
9. Complete the country-specific acceptance (§16 partial acceptance... /DHHS...).

 **WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Removing/replacing the I.I. optics

**Prerequisites:** Camera must already be removed.

1. Remove the 3 M4 screws (1/Fig. 13 / p. 46).
2. Remove the I.I. optics.
3. Install the (new) optics and camera in reverse order.
4. Adjust the camera and I.I. optics.
5. Perform the IQ test.

 **WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Adjusting the camera and I.I. optics (camera version < 2.0)

**Relevant systems:** ARCADIS Orbic system serial no. < 20038; or the camera was already replaced by the new camera version  $\geq 2.0$  (see ID label)

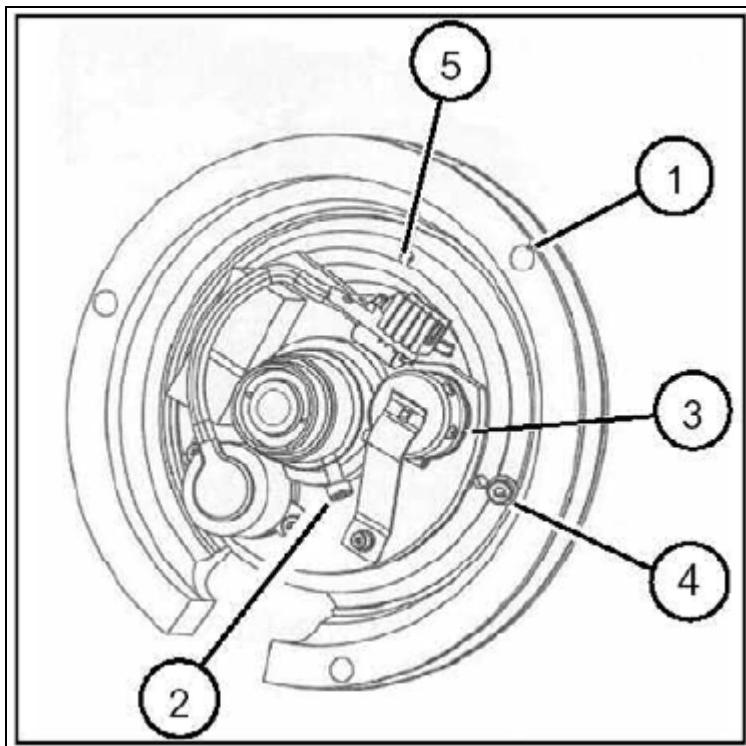


Fig. 14: Replacing the camera and the I. I. optics\_2

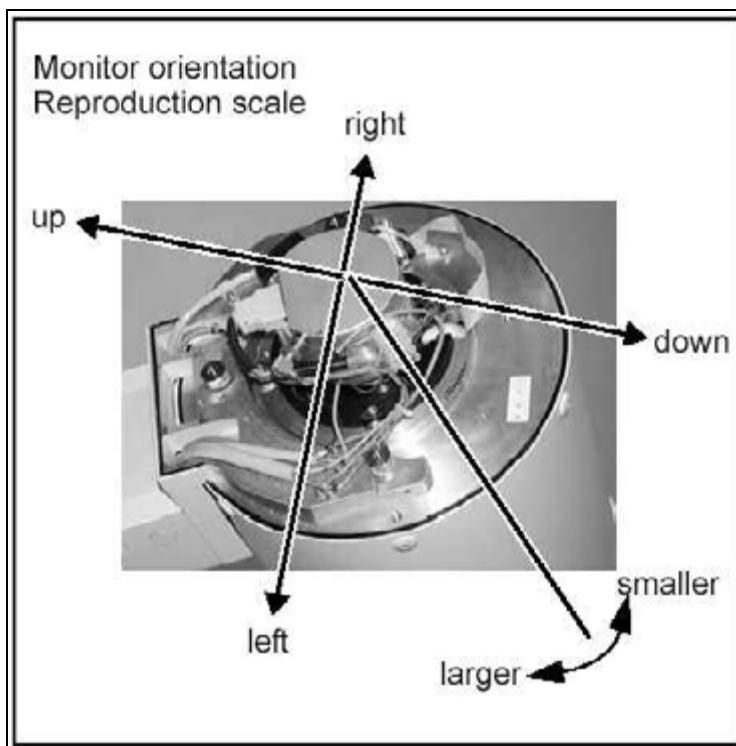


Fig. 15: Monitor orientation

## Centering the camera

**NOTE**

The camera can be centered by moving the optics. Centering is performed in the factory and should be acceptable. The camera optics must be moved toward the centering bolts.

**WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Reproduction scale adjustment

**Prerequisites:** Camera centering should be OK.

1. Loosen the clamping screw (4/Fig. 14 / p. 48).
2. Loosen the lock ring (5/Fig. 14 / p. 48).

3. Unplug the connectors (1/Fig. 12 / p. 45), (2/Fig. 12 / p. 45) and disconnect the fan wires (3/Fig. 12 / p. 45).
4. You can increase/decrease the image by turning the entire camera ((Fig. 15 / p. 49)). Always turn it a full turn because the camera plugs should be in the same position.
  - ⇒ Turn clockwise = larger image
  - ⇒ Turn counterclockwise = smaller image
5. Reattach the connectors (1/Fig. 12 / p. 45), (2/Fig. 12 / p. 45) and the fan wires (3/Fig. 12 / p. 45).
6. Release fluoro and check the image size. Repeat the adjustment if necessary.
7. Retighten the clamping screw (4/Fig. 14 / p. 48).
8. Open the service application and adjust the 0-degree position of the image.  
Path: <Service>-<Main System>-<Adjustment>-<Image Rotation>.
9. Perform the IQ test.

**⚠ WARNING**

**When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed. See the chapter "Prerequisites," section "Safety information and protective measures."**

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Camera focus

**Prerequisites:** Camera centering and camera reproduction scale should be OK.

1. Loosen the focus ring clamping screw (2/Fig. 14 / p. 48).
2. You can adjust the optimum sharpness by turning the focus ring (3/Fig. 14 / p. 48).
3. Release fluoro and check the sharpness. Repeat the adjustment if necessary.
4. Retighten the focus clamping screw (2/Fig. 14 / p. 48).
5. Perform the IQ test.

**NOTE**

**Adjusting the camera focus also has a slight effect on the reproduction scale. The reproduction scale adjustment may have to be repeated.**

 **WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Replacing the I.I.

### Checking the temperature indicator of the new I.I.

1. Prior to removing the I.I., check the temperature indicator of the new I.I.
2. If the inner square field of the indicator is white, the I.I. did not exceed the temperature range. Remove the temperature indicator.
3. If the indicator is discolored (inner field black), proceed according to IQ document RXD-000.038.01.

### Removing the I.I.



*Fig. 16: Removing the I.I. 1*

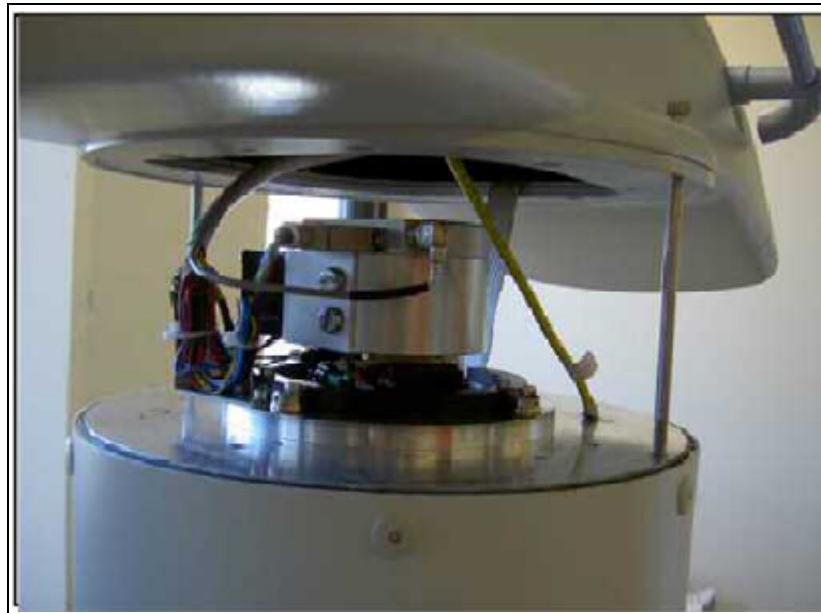


Fig. 17: Removing the I.I. 2

**CAUTION**

**Electrical voltage!**

See chapter 1, Safety Information.

- ⇒ Switch OFF the ARCADIS system and wait approximately 3 minutes for the voltage in the I.I. mini-voltage supply to drop.

1. Rotate the C-arm so that the I.I. is on top and the C-arm must be moved to the middle I.I. orbital position.
2. Place the I.I. on a table (see (Fig. 16 / p. 52)) or if this is not possible, use the I.I. “service screws” as shown in (Fig. 17 / p. 53).

**NOTE**

Make sure that the I.I. is placed on a secure table or a second person holds the I.I. when loosening the I.I. attachment screws.

3. Remove the 2 attachment screws from the I.I. mounting. When doing this, ensure that the I.I. is placed on a stable base or is secured by a second person when attaching the “service screws” (Fig. 17 / p. 53).
4. Disconnect all cables from the camera.
5. Remove the I.I. optics (incl. camera) refer to “Removing the I.I. Optics”.

**NOTE**

**Do not loosen the eccentric screws on the edge of the optics!**

These are used to center the optics with respect to the I.I. output screen.

When removing the optics, make sure that no dust or dirt contaminates the I.I. output window or the optics.

- Disconnect the cables from the I.I. mini-power supply.

## Installing the new I.I.

**NOTE**

**When installing the optics make sure that no dust or dirt contaminates the I.I. output window or the optics.**

- Install and connect the mini-power supply.
- Install (new) I.I., optic and camera in reverse order.
- Connect the camera cables in reverse order.

## Checks and adjustments

- Check the I.I. electrode voltages according to the test protocol for the I.I.
- Do not make readjustments in cases in which there are only slight deviations from the values on the test protocol (measurement device tolerances).
- Check the centering, reproduction scale and camera focusing. Refer to the previous description "Adjusting the Camera and I.I.Optics".
- Check the X-iris setting and readjust it as necessary.
- Check the display of the blades on the monitor and readjust it if necessary.
- Check the dose rate and readjust it if necessary.
- Perform the IQ test. Check the resolution first and readjust the optical resolution of the I.I. optics if necessary. Refer to the previous description "Adjusting the Camera and I.I. Optics".
- Complete the country-specific acceptance (§16 partial acceptance... /DHHS...).
- Solder the 2 wires to the cassette switch and remount the I.I. cover.

**WARNING**

**When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.**

**See the chapter "Prerequisites," section "Safety information and protective measures."**

**⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.**

## Frequency converter FU (vertical lift)

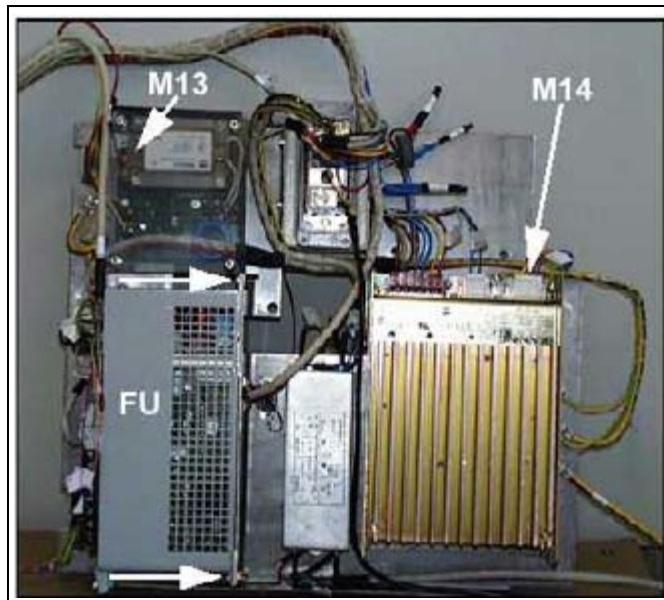


Fig. 18: Frequency converter

**⚠️ WARNING**

**Electrical voltage!**

See chapter 1, Safety Information.

⇒ Switch the system power supply off and disconnect the power plug.

1. Remove the Plexiglas cover over the plug field/clamp field of the frequency converter.
2. Disconnect the power plug.
3. Remove the cable clamps and cable ties at and in front of the frequency converter.
4. Disconnect all the cables at the frequency converter after documenting.
5. Replace the frequency converter after removing the Allen screws (refer to arrows (Fig. 18 / p. 55)).

**NOTE**

Prior to installing the new frequency converter, remove the bridge on X5 between PTC and -Uzk.

6. Reconnect all cables.
7. Reconnect the power plug.
8. Secure the cables with cable ties.
9. Reattach the cables with the cable clamps.
10. Perform a functional test of the vertical lifting column.

**Dose area product measuring device**

1. Switch the system off.
2. Remove the single-tank cover.
3. Replace the dose area product measuring device.
4. Open the local service, select <Main System>-<Adjustment>-<DAP/Air Kerma>, and check the accuracy of the dose area product measuring device.
  - ⇒ Perform a DAP accuracy check if DAP display is configured on the monitor.
  - ⇒ Perform an Air Kerma accuracy check if Air Kerma display is configured on the monitor.

## Laser targeting device

1. Remove the SIREPHOS cover. See chapter Prerequisites, Covers.
2. Replace the laser diodes after removing the bracket and unsolder the wires.
3. Adjust the laser diodes using the adjustment device supplied with the laser targeting device.
4. Reattach the SIREPHOS cover.
5. Seal the SIREPHOS cover using sealing compound. See chapter 1.

## Removing the SIREPHOS

1. Apply the angulation brake and the orbital brake of the C-arm.
2. Remove the end stop (rubber buffer) on the SIREPHOS side. The bolt with the mounting screws of the SIREPHOS is visible.
3. Remove all connection cables from the C-arm cable to the SIREPHOS.
4. Remove all connection cables to the collimator.
5. If a laser targeting device is present, unsolder the cables.
6. If a DIAMENTOR is present, disconnect the cable from the dose measuring chamber.
7. The image intensifier and C-arm must rest on the table.
8. One person holds the SIREPHOS, while the second person loosens the mounting screws of the SIREPHOS.
9. Remove the SIREPHOS from the table and set it on a suitable base.

**Integrated laser light localizer (I.I. -side)****Laser emissions!**

See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ **Do not look directly into the laser beam!**

1. Remove the I.I. ring at the I.I. input screen.
2. Remove the integrated I.I. laser light localizer and disconnect the small voltage plug, after removing the I.I. ring.
3. Remove the grid from the defective integrated I.I. laser light localizer and insert it at the new integrated I.I. laser light localizer .
4. Connect the voltage plug of the new integrated I.I. laser light localizer to the voltage plug of the I.I.
5. Attach the laser light localizer including the grid and the I.I. ring to the I.I. and fasten it with the screws.
6. Adjust the laser diode beams to the center point of the single tank. The I.I. should be on top, the SIREPHOS should be at the bottom, the C-arm angulation should be in the 0 degree position.



**When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.**

See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ **If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.**

## Horizontal swivel brake



### Risk of burn!

See chapter 1, Safety Information.

- ⇒ Releasing the swivel brake causes the brake magnet to heat up. Be sure to switch off the power supply and let the brake magnet cool off before touching it.



Swivel brake replacement kit 56 44 955 includes replacement instructions SPR2-230 841.02... Please use these instructions when performing the work steps.

**Vertical lift brake**

Fig. 19: Brake 2



Fig. 20: Brake 3

**Risk of injury!**

Noncompliance can lead to medium to severe injuries and/or property damage.

- ⇒ To replace the vertical lift brake, the ARCADIS Orbic must be placed on its side. This requires 6 people. To prevent damage to the ARCADIS Orbic or the floor, we recommend using several wool blankets, corrugated cardboard, or another suitable floor covering.

1. Remove the basic unit cover.
2. Carefully place the ARCADIS Orbic on its side.
3. Remove plug D30.X8 and eject the contacts.
4. Remove the three attachment screws for the vertical lift brake and replace the brake.
5. Remove plug D30.X8.
6. Eject the contacts from plug D30.X8.
7. Route the wires of the new vertical lift brake to board D30 and insert the contacts into the plug housing.

## Vertical lift motor



Fig. 21: Brake 4

---

**⚠️WARNING****Risk of injury!**

**Noncompliance can lead to medium to severe injuries and/or property damage.**

- ⇒ To replace the vertical lift motor, the ARCADIS Orbic must be placed on its side.
  - ⇒ This requires 6 people. To prevent damage to the ARCADIS Orbic or to the floor, we recommend using several wool blankets, corrugated cardboard, or another suitable floor covering.
- 

1. Remove the vertical lift magnet from the vertical lift motor (three screws).
2. Remove the attachment screws for the vertical lift motor.
3. Remove the vertical lift motor with the gears from the spindle.
4. Disconnect the wires from the frequency converter FU.
5. Route the wires of the new vertical lift motor to the frequency converter FU and connect them.
6. Place the new motor on the spindle. Make sure the spindle is seated correctly in the gears.
7. Attach the motor with the screws.
8. Install the vertical lift magnet on the vertical lift motor.
9. Return the ARCADIS Orbic to the upright position.
10. Lubricate the spindle and the lifting column mounting.

11. Check the vertical lift function. Also check that the vertical lift motor switches off at the end positions of the vertical lifting column. (limit switches).

## Vertical lift limit switches

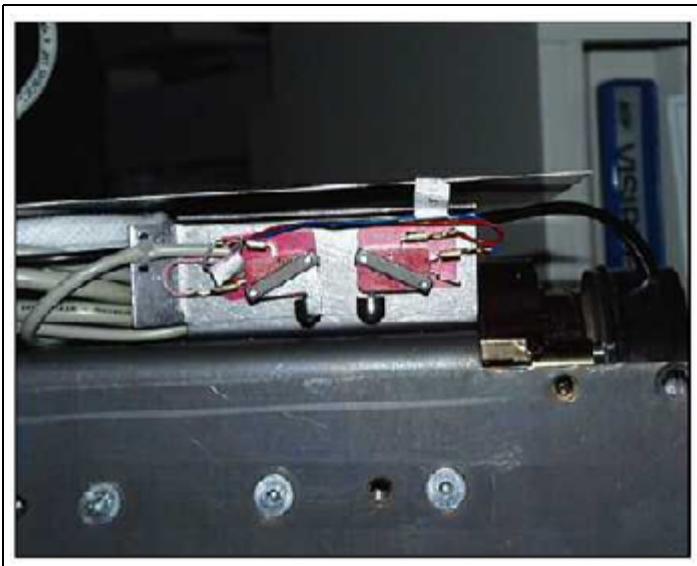


Fig. 22: Brake 5

1. Replace the limit switches. Reconnect the wires.
2. To adjust the limit switches, move the lifting column slowly and carefully by briefly tapping the lifting column switch at the control console of the basic unit until it is positioned just before the mechanical end stop.
3. Adjust the respective limit switch and tighten the screws.
4. Make sure the limit switch is functioning correctly.
5. To do this, move back out of the end position.
6. Then slowly and carefully move to the end position by briefly tapping the lifting column switch on the control console of the basic unit.
7. The lifting column motor must switch off prior to reaching the end position and the lifting column must come to a full stop.
8. Move the lifting column approximately 10 cm away from the end position.
9. Now move the lifting column at full speed in the direction of the end position by pressing and holding the lifting column switch.
10. The lifting column motor must switch off prior to reaching the mechanical end stop, and the lifting column must come to a full stop.

## Switch for blocking vertical lift

1. Remove the horizontal lift cover to replace both switches. Refer to chapter 1 of these instructions. Adjustment: Refer to the MODULARIS service instructions.

## Emergency off switch

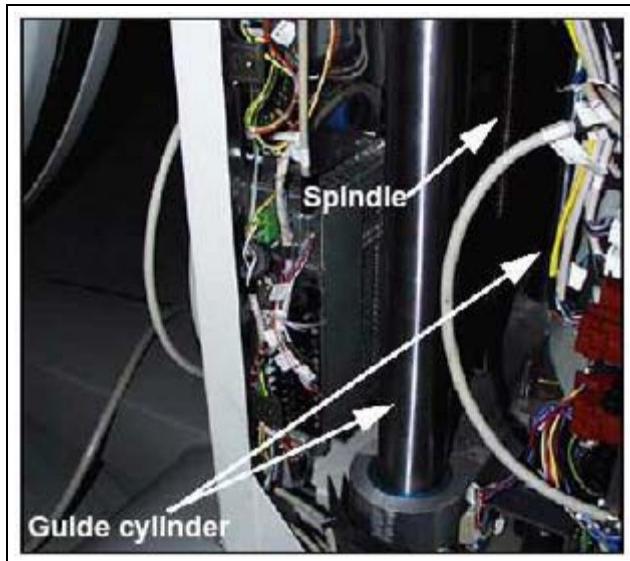


Fig. 23: Brake 6

1. Loosen the horizontal carriage cover.
2. Unsolder the emergency off switch.
3. Replace the emergency off switch.
4. Solder the wires on the emergency off switch.
5. Reinstall the horizontal carriage cover.
6. Check the functioning of the emergency off switch.
  - Emergency off switch pressed: vertical lift must not be possible.
  - Emergency off switch released: vertical lift must be possible.

## Lubricating the lifting column

**NOTE**

**Lubricate the spindle of the lifting column and the mounting of the guide cylinder once a year.**

### Spindle

1. Lubricate the spindle with approximately 10 - 20 ml of "Optimol, Optipit" special oil.

### Guide cylinder

1. Grease the guide cylinder with approximately 5 - 10 ml of special bearing grease "Slick Pac PTFE".
2. Then move the lifting column through the entire travel range twice to ensure that the grease is evenly distributed.

## Tensioning the drive belt

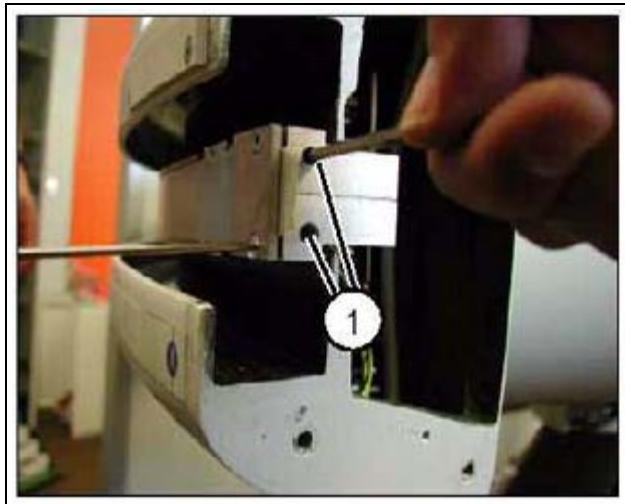


Fig. 24: Brake 7

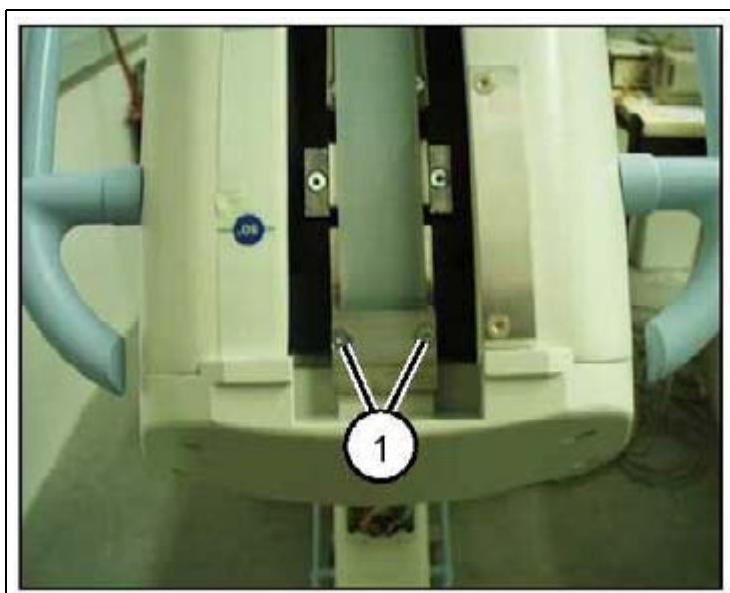


Fig. 25: Brake 8

**⚠ WARNING****Risk of injury!**

Noncompliance can lead to medium to severe injuries and/or property damage.

- ⇒ The C-arm covers contain counterbalance weights and weigh approx. 6 kg. Hold the covers firmly when installing or removing them. Before the C-arm cover is loosened, the C-arm must be moved to its middle orbital position. If the C-arm covers are loosened, the C-arm may not be moved to its orbital end positions (I.I. or SIREPHOS at the orbital end position).

1. Move the C-arm to the middle orbital position.
2. Remove the C-arm counterbalance weight on one side of the C-arm.
3. Loosen the drive belt ([1/Fig. 24 / p. 67](#)).
4. Loosen the drive belt holder ([1/Fig. 25 / p. 67](#)).
5. Adjust the drive belt in the holder by one tooth to tension it. Then fasten it again.
6. Reattach the drive belt holder.
7. Tension the drive belt ([1/Fig. 24 / p. 67](#)).
8. Reinstall the C-arm counterbalance weight.
9. Repeat the procedure at the other end of the C-arm.
10. After the counterbalance weights have been reattached on both sides, move the C-arm orbitally from one end to the other several times.
11. In the case of ARCADIS Orbic, also perform a scan.

If the belt tension is still insufficient, repeat the procedure and move the belt to the next tooth to shorten it further.

**⚠ WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## 3D reconstruction system electronics

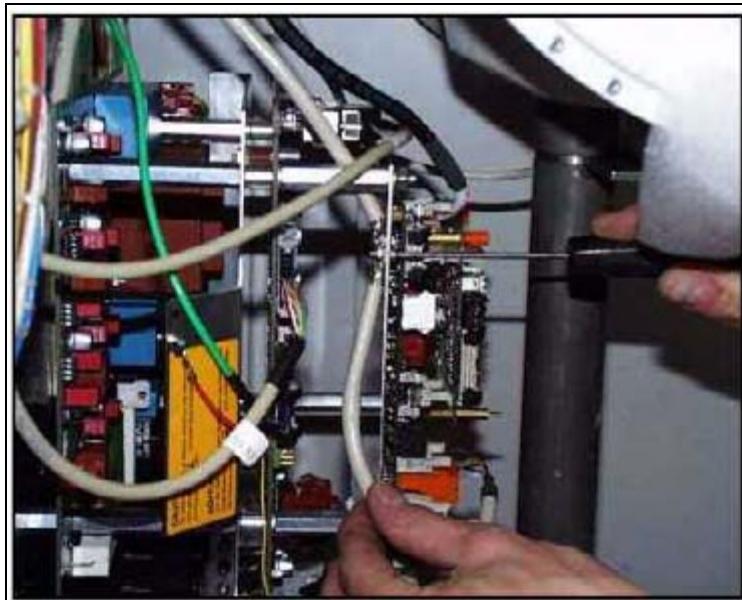


Fig. 26: 3D reconstruction system electronics

**NOTE**

Only applies to ARCADIS Orbic.

1. The 3D reconstruction system electronics (PC board D200 incl. MCB300 and D10) are attached in front of PC board D1 in the basic unit ([Fig. 26 / p. 69](#)).
2. Switch the system off.
3. Unplug all connectors.
4. Replace the module.
5. Reconnect all connectors.
6. Fasten the shielded cables in the shield connectors again, ensuring good ground contact of the shielding.
7. If cable ties have been removed, reattach the cables with cable ties.
8. Perform a download to the 3D component.  
Path: <Service>-<Main System>-<Download>-<3D>.
9. Perform the mechanical settings as described on the relevant system service pages.  
Path:<Service>-<Main System>-<3D Adjustment>.
10. Perform a 3D calibration as described on the relevant system service pages.  
Path: <Service>-<Main System>-<3D Calibration>.
11. Perform the IQ quick test, ARCADIS Orbic - chapter on “3D Resolution”.

**⚠️WARNING**

When these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

## Orbital motor

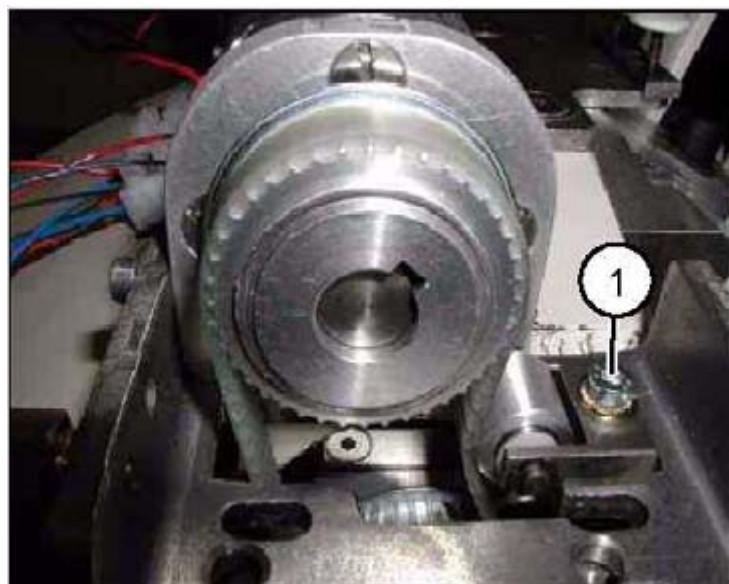


Fig. 27: Orbital motor 1

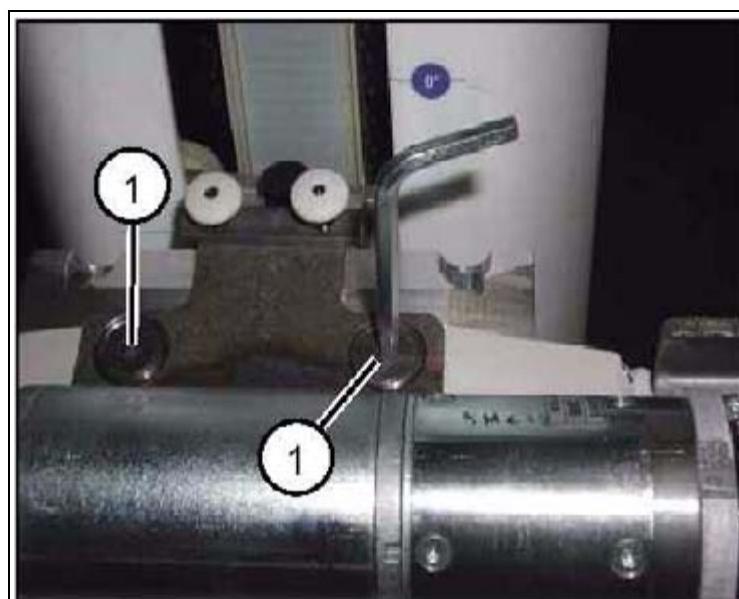


Fig. 28: Orbital motor 2

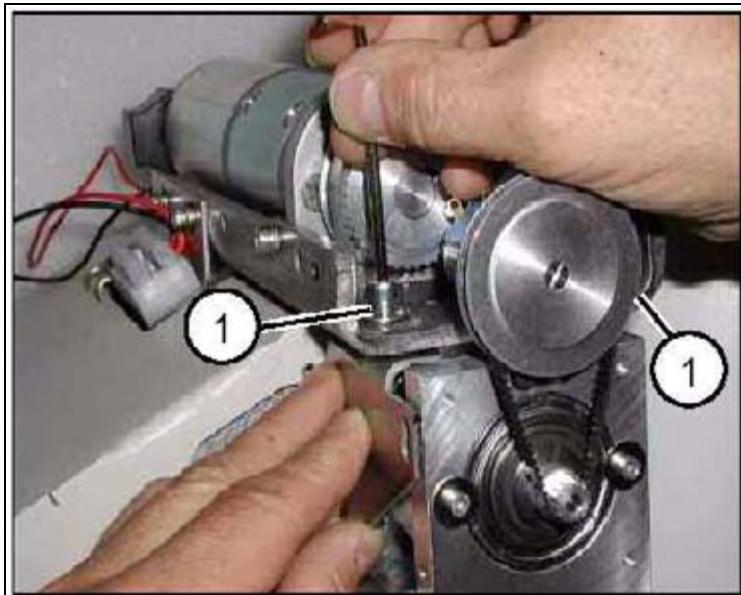


Fig. 29: Orbital motor 3

**NOTE**

**Only applies to ARCADIS Orbic.**

1. Loosen the belt tensioner of the toothed belt of the orbital drive ([1/Fig. 27 / p. 71](#)).
2. Disconnect the motor connecting cables (motor cables + incremental encoder).
3. Loosen the 2 fastening screws of the mounting plate (incl. motor) ([1/Fig. 28 / p. 71](#)).
4. Loosen the 2 fastening screws at the two lateral brackets ([1/Fig. 29 / p. 72](#)).
5. Carefully remove the mounting plate incl. the motor. In doing so, push the toothed belt off the pulley, ensuring that the actual value potentiometer and its pulley are not damaged or bent.
6. Detach the motor from the mounting plate.
7. Screw the new motor onto the mounting plate.
8. Reattach the mounting plate incl. the motor. In doing so, place the toothed belt over the pulley again, ensuring that the actual value potentiometer and its pulley are not damaged or bent.
9. Retighten the toothed belt of the orbital drive ([1/Fig. 27 / p. 71](#)). When depressed by thumb pressure on the opposite side, the belt should give approx. 2 to 3 mm.
10. Perform a functional check of the orbital drive. To do this, perform a 3D scan.

## Toothed belt of the orbital drive

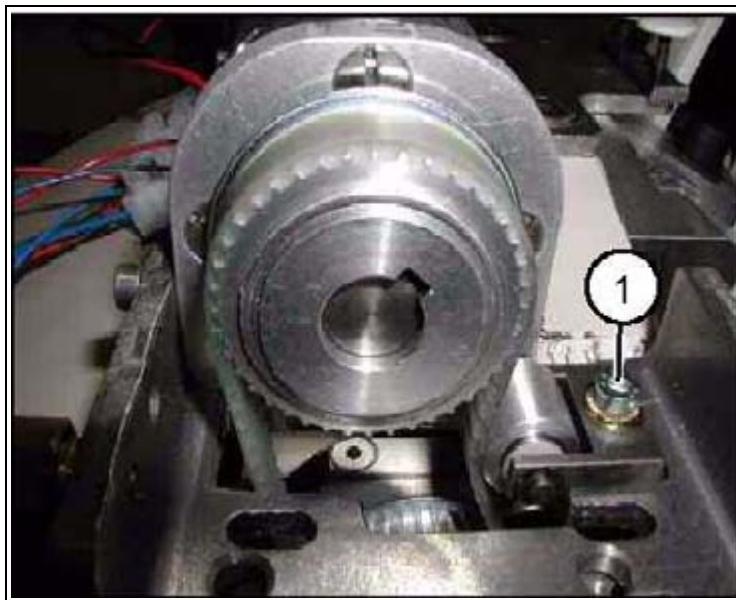


Fig. 30: Toothed belt of the orbital drive\_1

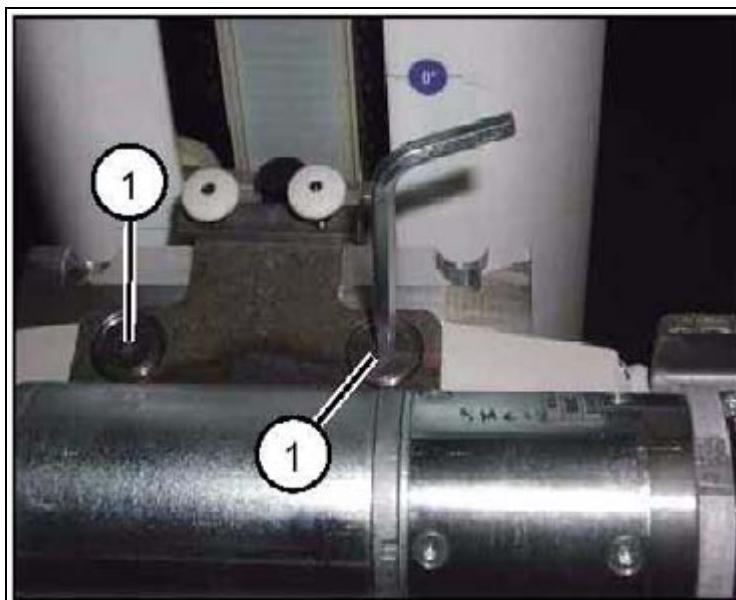


Fig. 31: Orbital motor 2

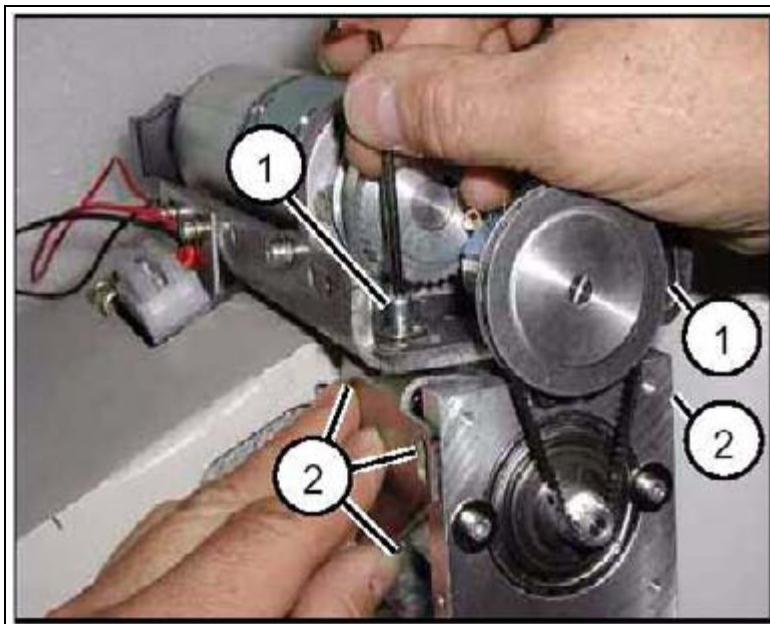


Fig. 32: Toothed belt of the orbital drive\_3

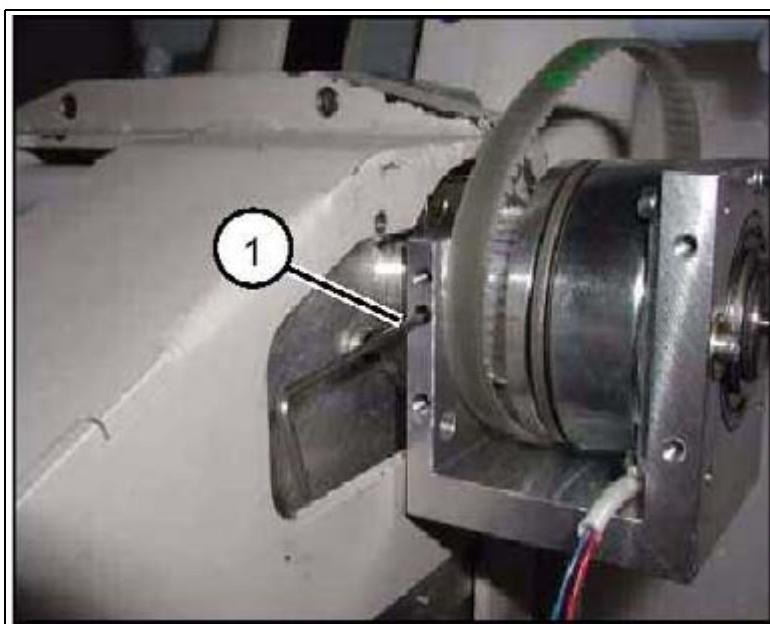


Fig. 33: Toothed belt of the orbital drive\_4

**NOTE**

Only applies to ARCADIS Orbic.

1. Loosen the belt tensioner of the toothed belt of the orbital drive (1/Fig. 30 / p. 73).
2. Disconnect the connecting cables of the orbital motor (motor cables + incremental encoder).
3. Loosen the 2 fastening screws of the mounting plate (incl. motor) (1/Fig. 31 / p. 73).
4. Loosen the 2 fastening screws at the two lateral brackets (1/Fig. 32 / p. 74).

5. Carefully remove the mounting plate incl. the motor. In doing so, push the toothed belt off the pulley, ensuring that the actual value potentiometer and its pulley are not damaged or bent.
6. Unscrew the two lateral brackets from the coupling unit (3 Allen screws each, [\(2/Fig. 32 / p. 74\)](#)).
7. Remove the two setscrews of the coupling unit. [\(1/Fig. 33 / p. 74\)](#) shows the length of the left setscrew. Also remove the right setscrew (not shown).
8. Remove the coupling unit from the centering disk.
9. Take the toothed belt off the pulley.
10. Place the new belt on the pulley.
11. Place the coupling unit back on the centering disk, ensuring that the shaft engages with the intermediate piece.
12. Press the coupling unit against the centering disk and screw it back on with the two set-screws [\(1/Fig. 33 / p. 74\)](#).
13. Reinstall the mounting plate incl. the motor. In doing so, place the toothed belt on the pulley again, ensuring that the actual value potentiometer and its pulley are not damaged or bent. Reconnect the motor and incremental encoder.
14. Reattach the two lateral brackets [\(2/Fig. 32 / p. 74\)](#). For guidance, insert the top two screws ([\(1/Fig. 32 / p. 74\)](#)), but do not tighten them completely yet. Tighten the lateral screws first, and then tighten the top two screws [\(2/Fig. 32 / p. 74\)](#).
15. Tension the toothed belt of the orbital drive again [\(1/Fig. 30 / p. 73\)](#). When depressed by thumb pressure on the opposite side, the belt should give approx. 2 to 3 mm.
16. Perform the mechanical settings as described on the relevant system service pages.

Path: <Service>-<Main System>-<3D Adjustment>.

## Orbital drive - actual value potentiometer

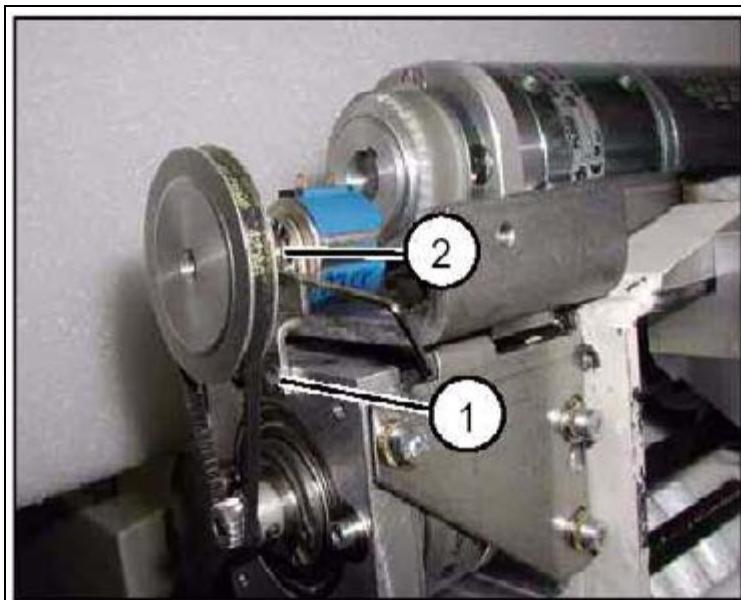


Fig. 34: Belt of the actual value potentiometer 1



Fig. 35: Belt of the actual value potentiometer 2

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**NOTE**

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**Only applies to ARCADIS Orbic.**

---

1. Move the C-arm orbitally into the -95° end position.
2. The orbital limit switch on the tube unit side is actuated.
3. Take note of the order in which the cables of the actual value potentiometer are connected.
4. Unsolder the connecting cables of the actual value potentiometer.

5. Loosen the two fastening screws of the actual value potentiometer at the front of the coupling unit ([1/Fig. 34 / p. 76](#)).
6. Take the belt off the pulleys.
7. Remove the actual value potentiometer.
8. Unscrew the Allen screw of the large pulley and remove the pulley from the actual value potentiometer ([2/Fig. 34 / p. 76](#)).
9. Unscrew the securing bracket from the old potentiometer and attach it to the new potentiometer.
10. Attach the large pulley to the new actual value potentiometer.
11. Reattach the actual value potentiometer to the coupling unit. In doing so, place the toothed belt on the pulley again and tension it. The toothed belt should be tight, but without any mechanical tension.
12. Solder the connecting cables back to the potentiometer in the original order.
13. Continue with the “Setting the actual value potentiometer for C-arm orbital movement” section.

## Setting the actual value potentiometer for C-arm orbital movement

**NOTE**

Prior to setting the actual value potentiometer, the C-arm must be in the orbital -95° position (the orbital limit switch on the tube side is actuated). If this is not the case, loosen the Allen screw of the large pulley before moving the C-arm ([\(2/Fig. 34 / p. 76\)](#)) to prevent overturning of the actual value potentiometer.

1. The C-arm is in the -95° position. See note.
2. Loosen the Allen screw of the large pulley ([2/Fig. 34 / p. 76](#)).
3. Using a screwdriver, turn the actual value potentiometer counterclockwise to the end stop ([Fig. 35 / p. 76](#)).
4. Then turn it two turns in a clockwise direction.
5. Retighten the Allen screw of the large pulley.
6. Perform the mechanical settings as described on the relevant system service pages.  
Path: <Service>-<Main System>-<3D Adjustment>.

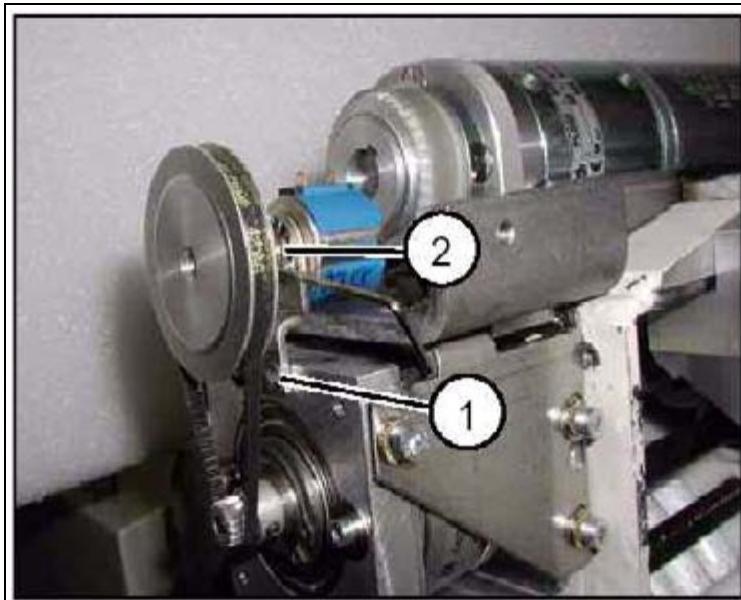
**Belt of the actual value potentiometer for orbital movement**

Fig. 36: Belt of the actual value potentiometer 1

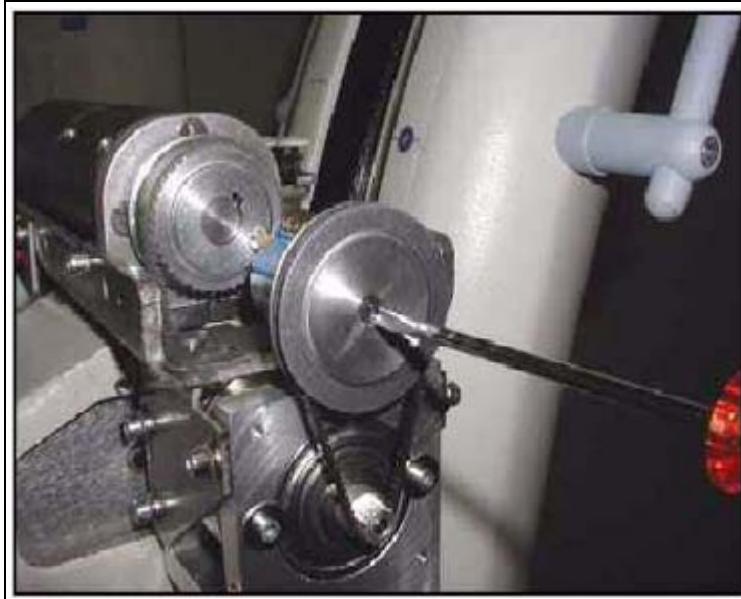


Fig. 37: Belt of the actual value potentiometer 2

**NOTE**

---

Only applies to ARCADIS Orbic.

---

1. Move the C-arm orbitally into the -95° end position.
2. The orbital limit switch on the tube unit side is actuated.
3. Loosen the two fastening screws of the actual value potentiometer on the front of the coupling unit, but do not remove them (1/[Fig. 36 / p. 78](#)).
4. Take the toothed belt off the pulleys.

5. Place the new toothed belt on the pulleys.
6. Tension the belt: The toothed belt should be tight, but without any mechanical tension.
7. Retighten the two fastening screws.
8. Continue with the “Setting the potentiometer for C-arm orbital movement” section.

## Setting the potentiometer for C-arm orbital movement

**NOTE**

Prior to setting the actual value potentiometer, the C-arm must be in the orbital -95° position (the orbital limit switch on the tube side is actuated). If this is not the case, loosen the Allen screw of the large pulley before moving the C-arm ([\(2/Fig. 36 / p. 78\)](#)) to prevent overturning of the actual value potentiometer.

1. The C-arm is in the -95° position. See note.
2. Loosen the Allen screw of the large pulley ([\(2/Fig. 36 / p. 78\)](#)).
3. Using a screwdriver, turn the actual value potentiometer counterclockwise to the end stop ([Fig. 37 / p. 78](#)).
4. Then turn it two turns in a clockwise direction.
5. Retighten the Allen screw of the large pulley.
6. Perform the mechanical settings as described on the relevant system service pages.  
Path: <System>-<Main System>-<3D Adjustment>.

## Angulation part

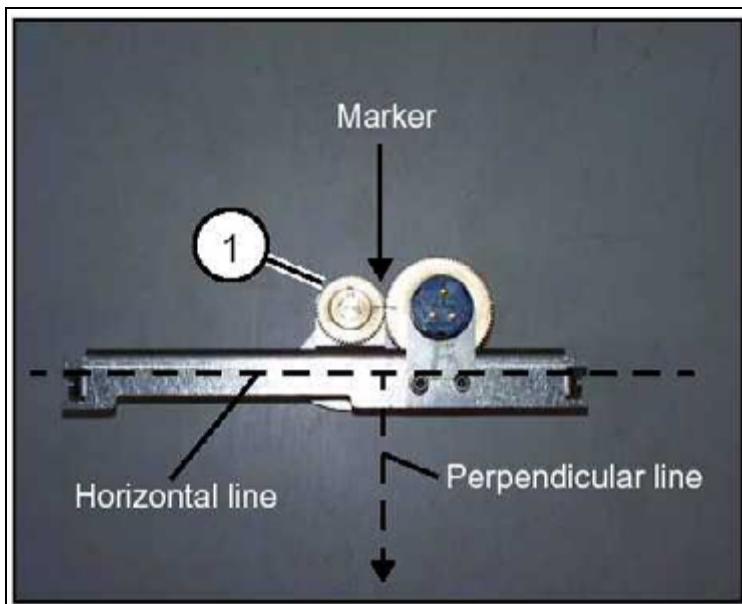


Fig. 38: Angulation part

**NOTE**

When the angulation part is vertical, the markings on the two toothed belts must coincide (see (Fig. 38 / p. 80)).

**NOTE**

Only applies to ARCADIS Orbic.

1. If the toothed wheel (1/Fig. 38 / p. 80) was turned several times during transport, the perpendicular part must be turned prior to installation in one direction until the markings coincide again when the angulation part is vertical.
2. Move the C-arm to the 0° position
3. Disconnect the actual value potentiometer cable.
4. Loosen the fastening screws of the angulation part.
5. Replace the angulation part. In doing so, ensure that the markings (black lines) on the two toothed wheels coincide when the C-arm is perpendicular.
6. Reconnect the actual value potentiometer cable.
7. Perform the mechanical settings as described on the relevant system service pages.  
Path: <Service>-<Main System>-<3D Adjustment>.

## Replacing the power supply assembly

**WARNING**

Electrical voltage!

See chapter 1, Safety Information.

- ⇒ Switch system power supply off, disconnect the power plug and disconnect all power plugs from the UPS.

**NOTE**

The power supply assembly is programmed to 230V AC mains voltage. Ensure that the new power supply is programmed to the local mains voltage value and the F1 and F2 fuses are changed to the correct value, as printed in the system's circuit diagram.

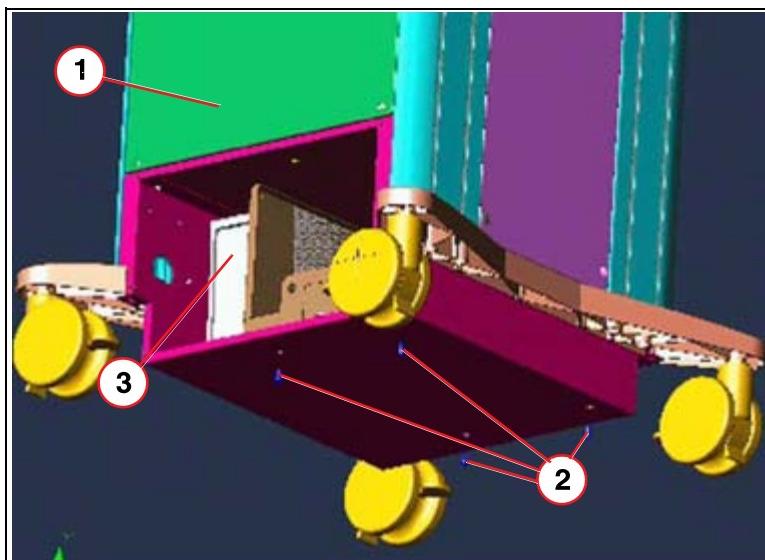


Fig. 39: Power supply

1. Switch off the system.
2. Remove the system power plug.
3. Disconnect all UPS power plugs (input and output plugs).
4. Unscrew the 4 screws from the rear cover and remove the cover ([1/Fig. 39 / p. 81](#))
5. Unscrew the 6 screws from the lower rear cover and remove the cover (cover already removed in ([Fig. 39 / p. 81](#))).
6. Unscrew the 4 Allen screws ([2/Fig. 39 / p. 81](#)) for the power supply component.

7. Pull the power supply component about 10cm out of the trolley.

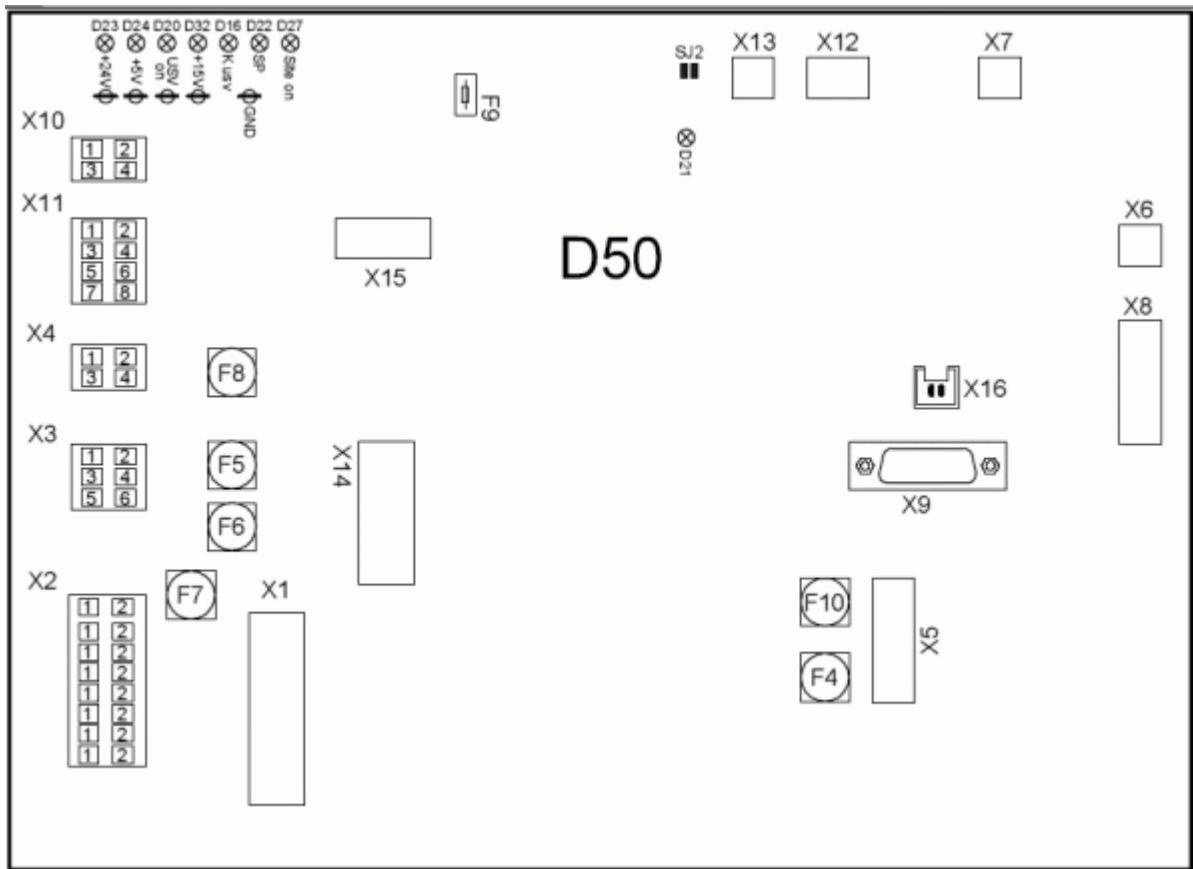


Fig. 40: D 50

8. Disconnect the power line at connector D50 X 11

- ⇒ Live Monitor - X 11.2 blue / X 11.5 brown
- ⇒ Imaging System (PC) - X 11.3 blue / X 11.6 brown
- ⇒ UPS output - X 11.1 blue / X 11.4 brown

9. Disconnect the power line at connector D50 X 2

- ⇒ Reference Monitor - X 2.1 blue / X 2.2 brown
- ⇒ Paper Printer (option) - X 2.1 blue / X 2.2 brown

10. Disconnect the power line at connector D50 X 4

- ⇒ UPS input - X 4.2 blue / X 4.3 brown

11. Disconnect the display unit cable at connector D50 X 3

- ⇒ X 3.1 = green / X 3.2 = red / X 3.3 = yellow / X 3.4 = black / X 3.5 = violet / X 3.6 = blue

12. Disconnect the ground wires coming from the monitor trolley and the monitor cable.

13. Unplug D50 X6, X7, X8, X9, X12 and the X13 connector.

14. Unplug the PC connectors D 66 X4 (BNC) and D66 X5 (Fig. 46 / p. 91) and pull these cables down.

15. Remove the cable clamps from the monitor cable and the power cable.

16. Disconnect and pull the monitor cable and the power cable out of the power supply assembly.
17. Remove the power supply component from the monitor trolley.
18. Program the mains voltage of the new power supply assembly (transformer T1 and T2) to the local mains voltage value.
19. Check the fuse values of the F1 and F2 fuses.
  - ⇒ If needed, replace them with fuses with the correct values for the programmed local mains voltage value (100V AC to 127V AC: 20A slow blow / 200V AC to 240V AC: 15A slow blow, see wiring diagram of the system).
20. Install the new power supply component in reverse order.
21. Reconnect all power plugs to the UPS.
22. Switch on the system and perform a functional test.

## Replacing the UPS



**Electrical voltage!**

See chapter 1, Safety Information.

⇒ Switch system power supply off, disconnect the power plug and disconnect all power plugs from the UPS.

---

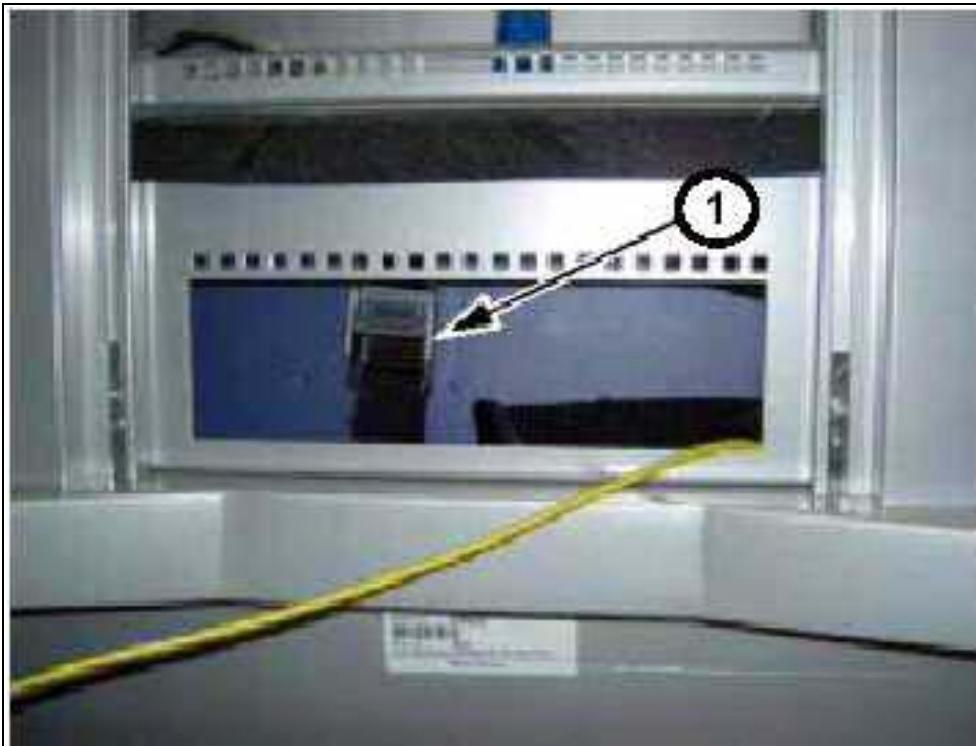


Fig. 41: Replacing the UPS\_2

1. Remove the rear cover from the monitor trolley.
2. Disconnect all power plugs from the UPS.
3. Loosen the tension belt ([1/Fig. 41 / p. 84](#)) and remove the UPS from the monitor trolley.  
Side covering was already removed in ([Fig. 41 / p. 84](#)).
4. Switch off the UPS by pressing the power switch.

**NOTE**

**UPS MGE type 850: To switch the UPS off or on, the power switch needs to be pressed for > 2 seconds.**

---

5. Switch on the new UPS by pressing the power switch.
6. Install the new UPS component in reverse order.
7. Switch on the system and perform a functional test.

**NOTE**

For correct functionality of the UPS, the new battery should be charged for approx. 8 hours. If possible, after all service tasks are performed, switch the system off, but leave the monitor trolley connected to the mains voltage wall socket. As long as the power plug of the monitor trolley is plugged into the mains voltage wall socket, the UPS battery is charged.

## Replacing the UPS battery



**Electrical voltage!**

See chapter 1, Safety Information.

- ⇒ Switch system power supply off, disconnect the power plug and disconnect all power plugs from the UPS.



**Risk of burn and of destroying the battery component due to possible high short-circuit current!**

Wearing metal objects like rings, watches, bracelets and using tools with uninsulated handles during procedures can lead to a short-circuit of the battery contacts. This can destroy the battery component and heat up the metal objects, causing a short-circuit at very high temperatures.

- ⇒ Before servicing the battery components, remove watches, rings, bracelets and all other metal objects from the hands and arms. Use tools with insulated handles.

### UPS MG E Type 800

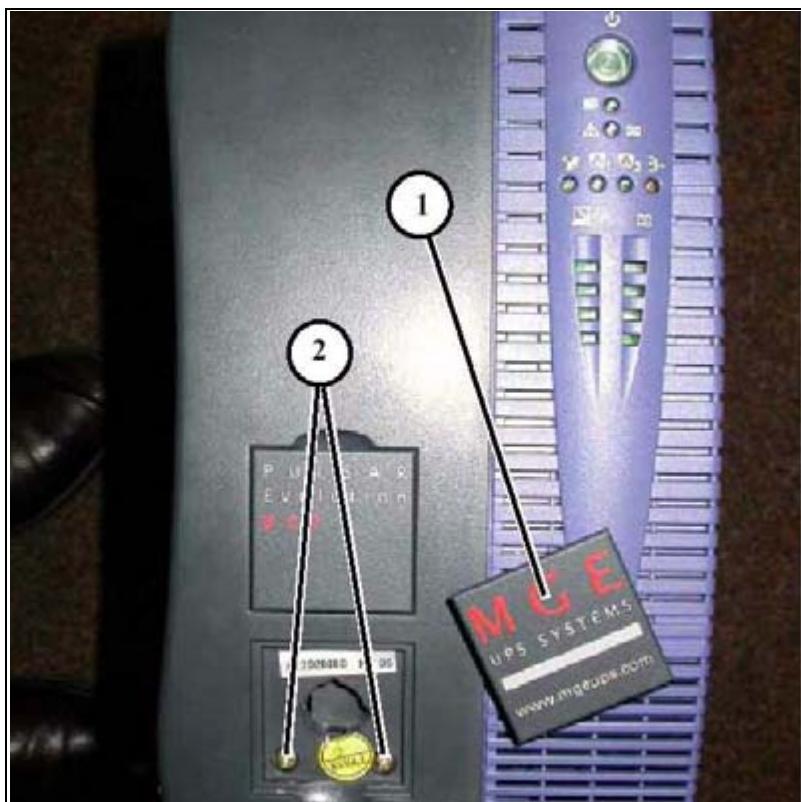


Fig. 42: Replacing the UPS\_battery\_1



Fig. 43: Replacing the UPS\_battery\_2

1. Disconnect all power plugs from the UPS.
2. Remove the UPS from the monitor trolley.
3. Switch off the UPS by pressing the power switch on the UPS.
4. Remove the plastic cover “MGE UPS Systems” ([1/Fig. 42 / p. 86](#)) from the UPS.
5. Unscrew the 2 slotted grub screws ([2/Fig. 42 / p. 86](#)) from the UPS and remove the front cover.
6. Disconnect the connector ([1/Fig. 43 / p. 87](#)) and remove the battery from the slot.
7. Insert the new battery into the UPS.
8. Connect the battery connector in front of the battery.

**NOTE**

Make sure that the battery connector contacts are not bent when plugged in! Check the contact ([1/Fig. 43 / p. 87](#)) if the system does not switch on.

9. Install the UPS front cover and fasten it with the screws.
10. Install the UPS plastic cover “MGE UPS Systems.”
11. Switch on the UPS by pressing the power switch on the UPS.
12. Insert the UPS component into the monitor trolley in reverse order.

**NOTE**

For correct functionality of the UPS, the new battery should be charged for approx. 8 hours. If possible, after all service tasks are performed, switch the system off, but leave the monitor trolley connected to the mains voltage wall socket. As long as the power plug of the monitor trolley is plugged into the mains voltage wall socket, the UPS battery is charged.

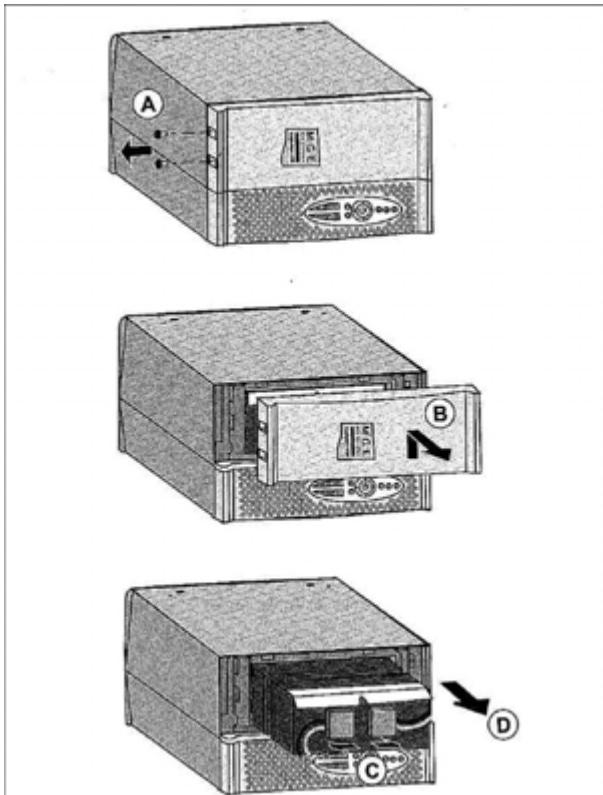
**MGE UPS Type 850**

Fig. 44: UPS MGE 850 Battery change

1. Disconnect all power plugs from the UPS.
2. Remove the UPS from the monitor trolley.
3. Switch off the UPS by pressing the power switch at the UPS for more than 2 seconds.
4. Place the UPS on its side as shown in (Fig. 44 / p. 88).
5. Remove the 2 screws on the bottom of the UPS as shown in A, (Fig. 44 / p. 88).
6. Lift up and pull out the front cover as shown in B, (Fig. 44 / p. 88).
7. Disconnect the battery connector in front of the battery and pull the battery out of the slot.
8. Insert the new battery into the UPS.
9. Connect the battery connector in front of the battery.

**NOTE**

Make sure that the battery connector contacts are not bent when plugged in! Check the contact (1/Fig. 43 / p. 87) if the system does not switch on.

10. Install the UPS front cover and fasten it with the screws.
11. Switch on the UPS by pressing the power switch on the UPS for more than 2 seconds.
12. Insert the UPS component into the monitor trolley in reverse order.

**NOTE**

For correct functionality of the UPS, the new battery should be charged for approx. 8 hours. If possible, after all service tasks are performed, switch the system off, but leave the monitor trolley connected to the mains voltage wall socket. As long as the power plug of the monitor trolley is plugged into the mains voltage wall socket, the UPS battery is charged.

## Replacing the keyboard

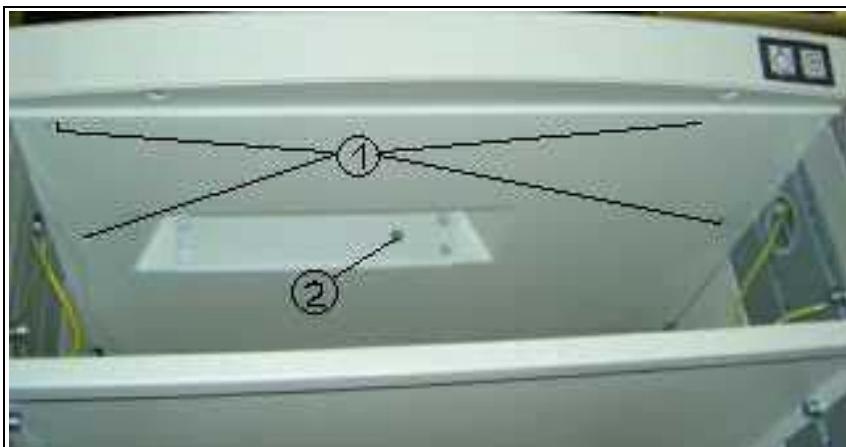


Fig. 45: Replacing the keyboard\_3

1. Remove the 4 screws ([1/Fig. 45 / p. 90](#)).
2. Lift the keyboard up and out of the monitor trolley.
3. Unplug the keyboard connectors.
4. Install the new keyboard in reverse order.
5. Perform a functional test.

## Replacing the PC

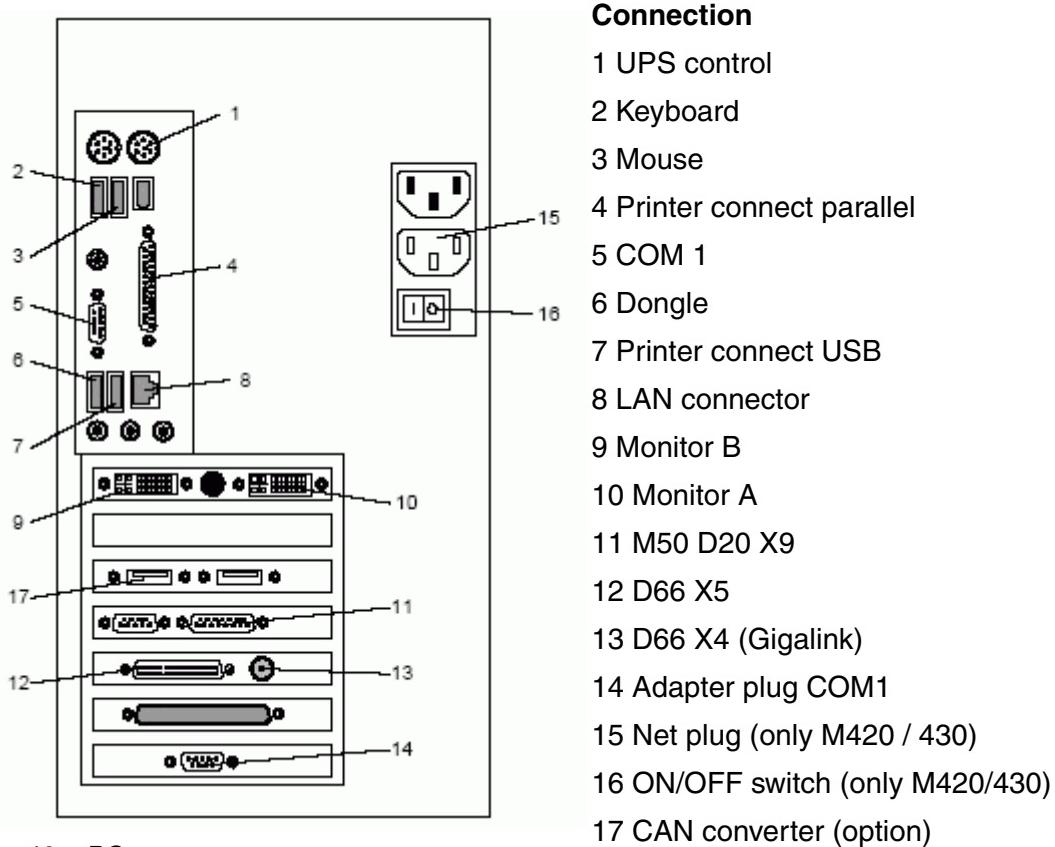


Fig. 46: PC rear

1. Save patient data and create a backup if possible.
2. Switch off the system and remove the system power plug.
3. Unscrew the 6 screws from the rear cover ([\(1/Fig. 39 / p. 81\)](#) and remove the cover.
4. Unplug all cable connections from the PC ([\(Fig. 46 / p. 91\)](#).
5. Loosen the tension belt from the PC.
6. Remove the old PC and insert the new PC.
7. Reconnect all PC plugs ([\(Fig. 46 / p. 91\)](#).

**NOTE**

All plugs must be connected as shown in the above figure for software installation to be successful (see ([\(Fig. 46 / p. 91\)](#)).

8. Switch on the system and install the software according to the "System Software Installation" instructions.
9. Perform a functional test and an IQ Quick test.

**⚠️WARNING**

Once these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed and that the navigation system must be checked and certified before it is used again.

## Replacing PC covers

### Opening the casing

#### PC M420 and 430

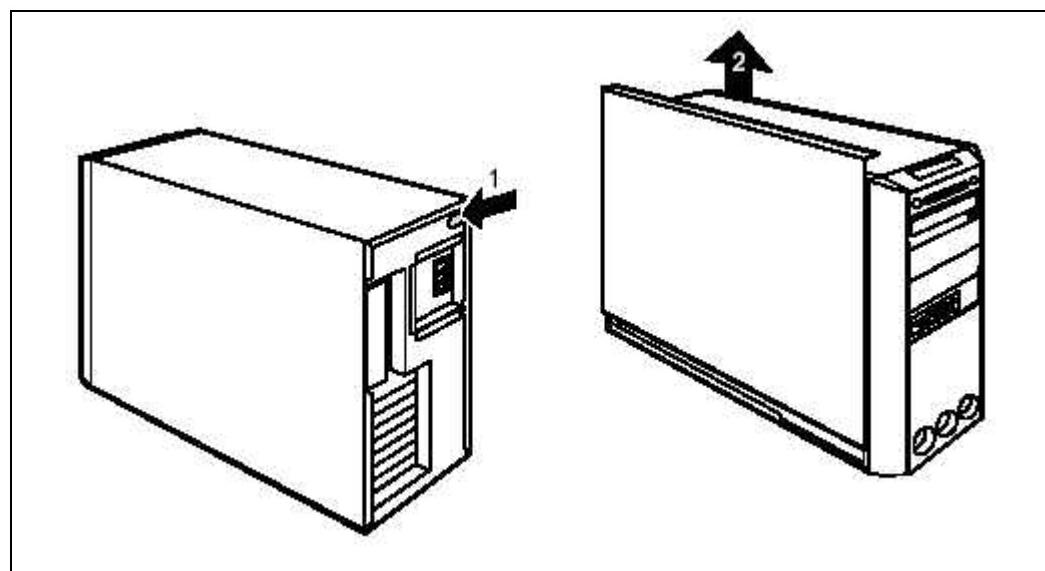


Fig. 47: Remove PC covers

1. Switch off the system.
2. Unplug the power plug from the power outlet.
3. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
4. Press the green unlocking button on the rear of the casing ([1/Fig. 47 / p. 93](#)).
5. Hold the green unlocking button down and slide the casing side cover upwards in the direction of the arrow ([2/Fig. 47 / p. 93](#)).
6. Pull the side cover out of the casing.

#### PC M450

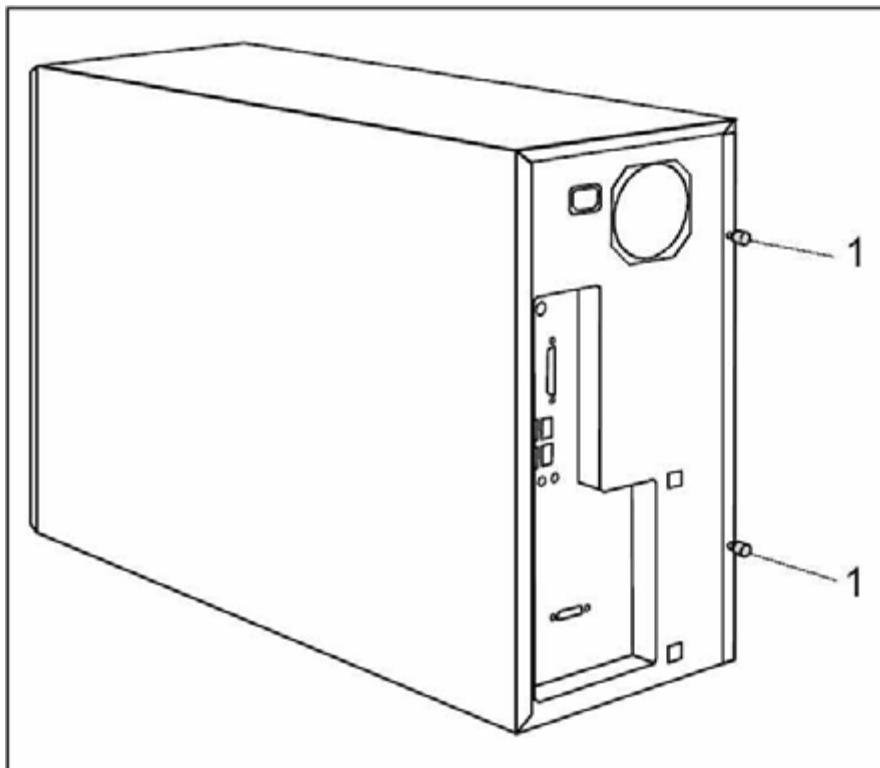


Fig. 48: Remove PC cover\_a M450

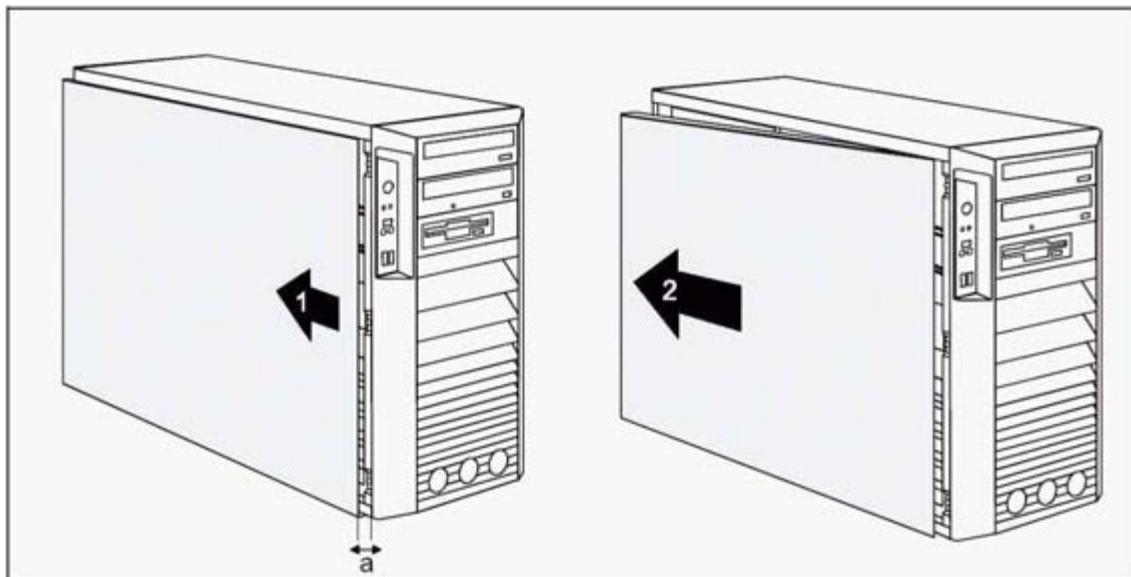


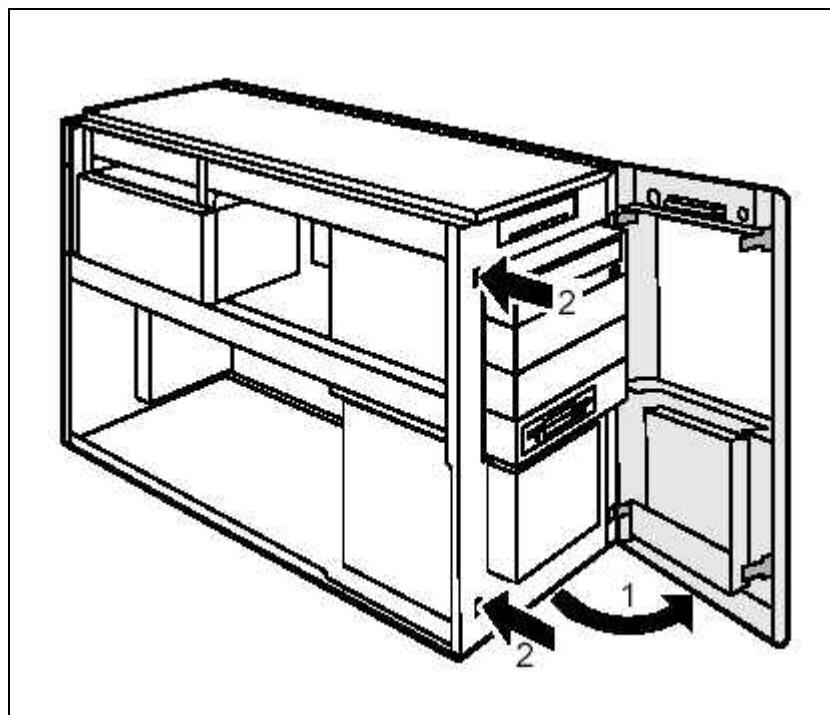
Fig. 49: Remove PC cover\_b M450

1. Switch off the system.
2. Unplug the power plug from the power outlet.
3. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
4. Unscrew the two knurled screws ([1/Fig. 48 / p. 94](#)) on the back of the casing.
5. Slide the side cover approximately 2 cm ([a/Fig. 49 / p. 94](#)) in the direction of the arrow ([1/Fig. 49 / p. 94](#)) until the stop.

6. Pull the side cover in the direction of the arrow (2/[Fig. 49 / p. 94](#)) on the casing.

## Removing the front panel

### PC M420 and M430



*Fig. 50: Removing the front panel*

1. Replace the PC from the monitor trolley([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Detach the unlocking lever ([2/\*Fig. 50 / p. 95\*](#)) and open the front panel ([1/\*Fig. 50 / p. 95\*](#)).
4. Detach the plastic hook from the front panel of the casing and carefully remove the front panel. If you pull too hard, you may loosen or damage the LCD cable.
5. The LCD cable is long enough so that you can carefully place it to one side of the front panel. You do not need to unplug the cable before removing the front panel.

### PC M450

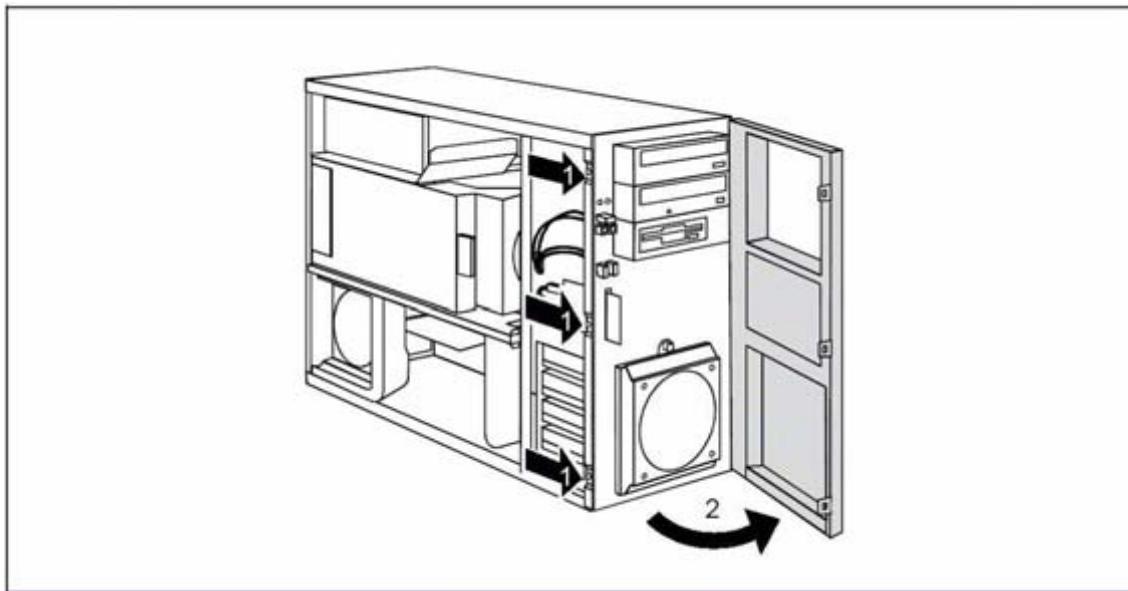


Fig. 51: Opening the front panel M450\_

1. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Detach the three locking tabs on the left side of the front panel (1/[Fig. 51 / p. 96](#)).
4. Open up the front in the direction of the arrow (2/[Fig. 51 / p. 96](#)).
5. If necessary, detach the pivot axle on the right-hand side of the front panel from the casing and carefully remove the front panel.

## Replacing the drive

PC M420 and M430

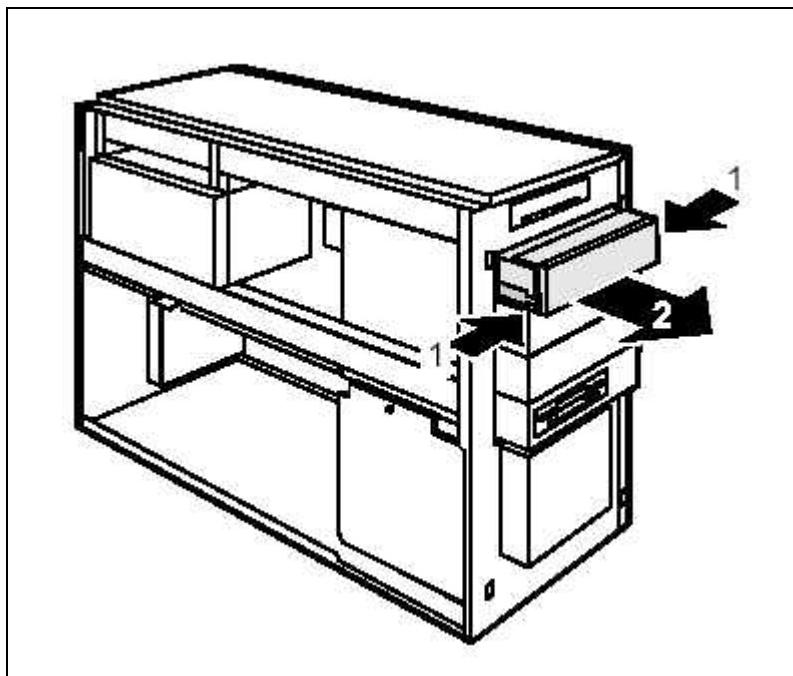
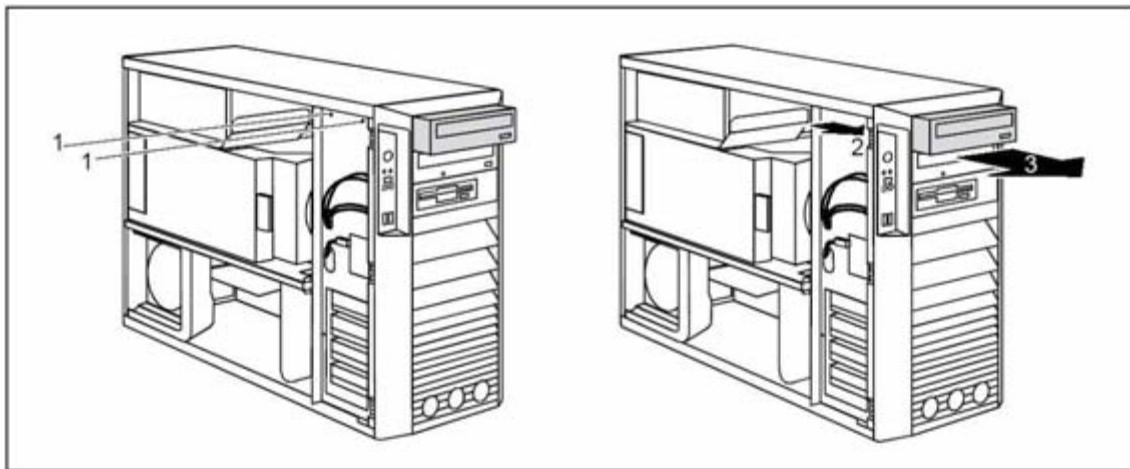


Fig. 52: Replacing the drive

1. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Remove the front ([Removing the front panel / p. 95](#)).
4. Disconnect the data and the power supply connectors from the drive.
5. Press the rails ([1/Fig. 52 / p. 97](#)) together and pull the drive out of the casing ([2/Fig. 52 / p. 97](#)).
6. Push the new drive into the casing until the rails engage.
7. Plug the data and the power supply connectors into the drive. Make sure the polarity is correct.
8. Attach the front panel in reverse order.
9. Close the casing in reverse order.
10. Reinstall the PC in reverse order and reconnect the PC plugs (see ([Fig. 46 / p. 91](#))).
11. Perform a functional test.



PC M450



*Fig. 53: Replacing the drive M450*

1. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Remove the front ([Removing the front panel / p. 95](#)).
4. Disconnect the data and the power supply connectors from the drive.
5. Loosen the screws ([1/Fig. 53 / p. 98](#)).
6. Slide the drive out of the bay in the direction of the arrow ([2/Fig. 53 / p. 98](#)) from behind. The drive now jumps out slightly out of the casing.
7. Slide the drive out of the casing ([3/Fig. 53 / p. 98](#)).
8. Push the new drive into the casing until the rails engage.
9. Plug the data and the power supply connectors into the drive. Make sure the polarity is correct.
10. Attach the front panel in reverse order.
11. Close the casing in reverse order.
12. Reinstall the PC in reverse order and reconnect the PC plugs (see ([Fig. 46 / p. 91](#))).
13. Perform a functional test.



## Replacing the lithium battery

**Prerequisite:** The software installation CD / DVD for the system (includes BIOS installation) must be available.

### PC M420 and M430

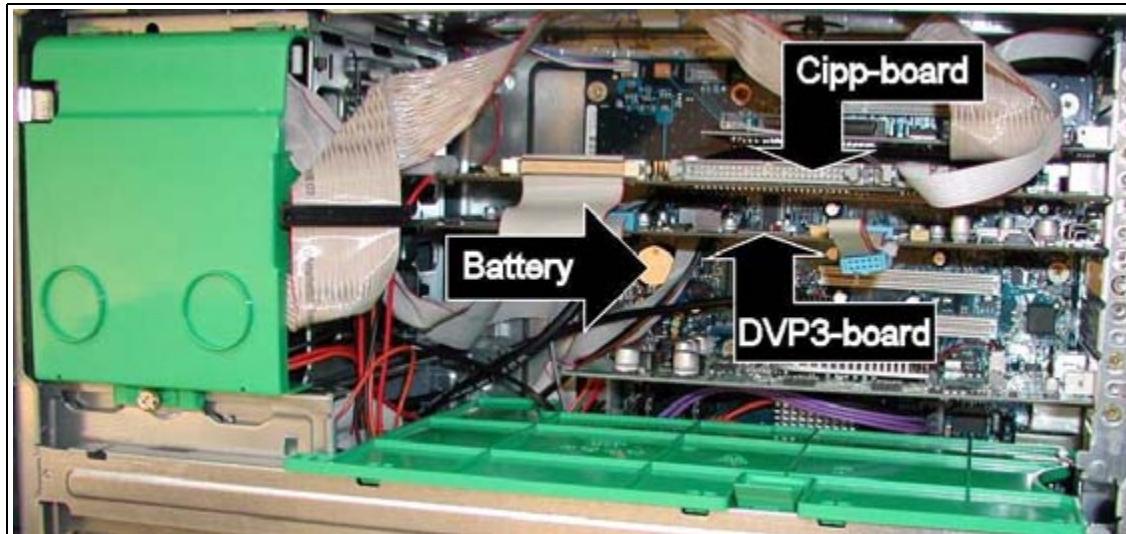


Fig. 54: Replacing the lithium battery\_1

### PC M450

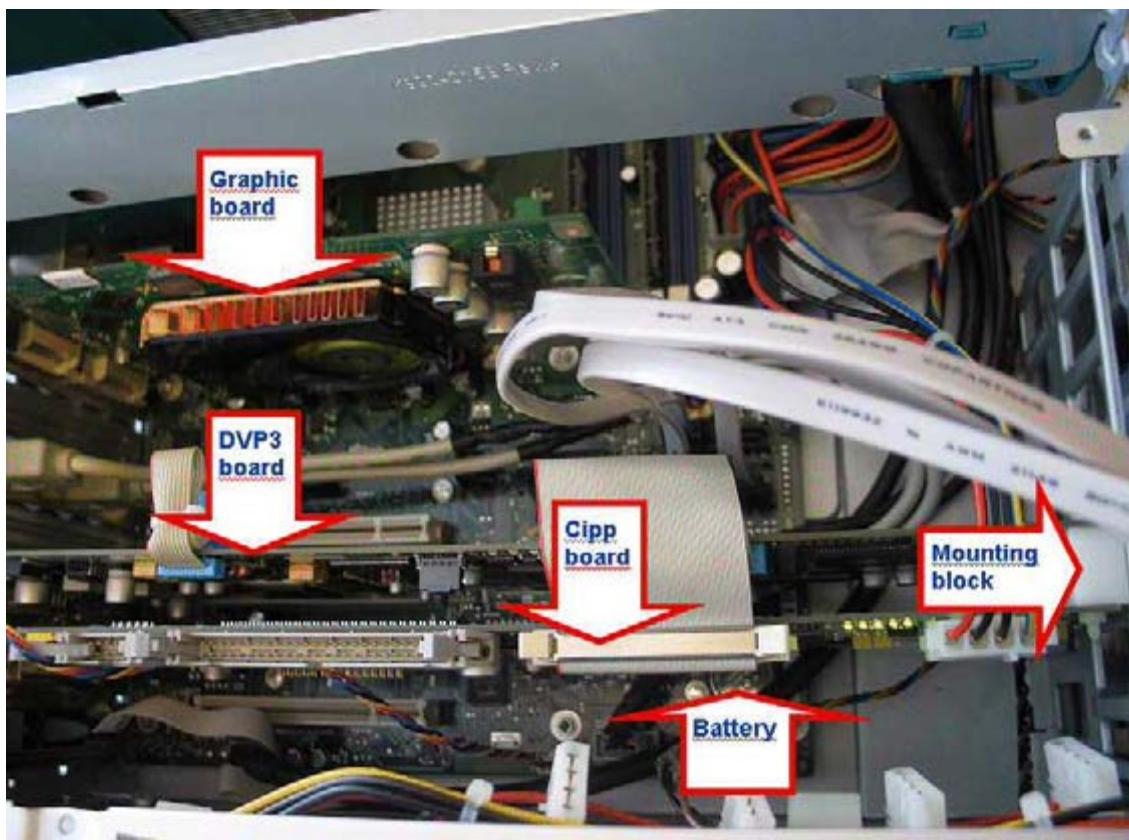


Fig. 55: Components M450\_

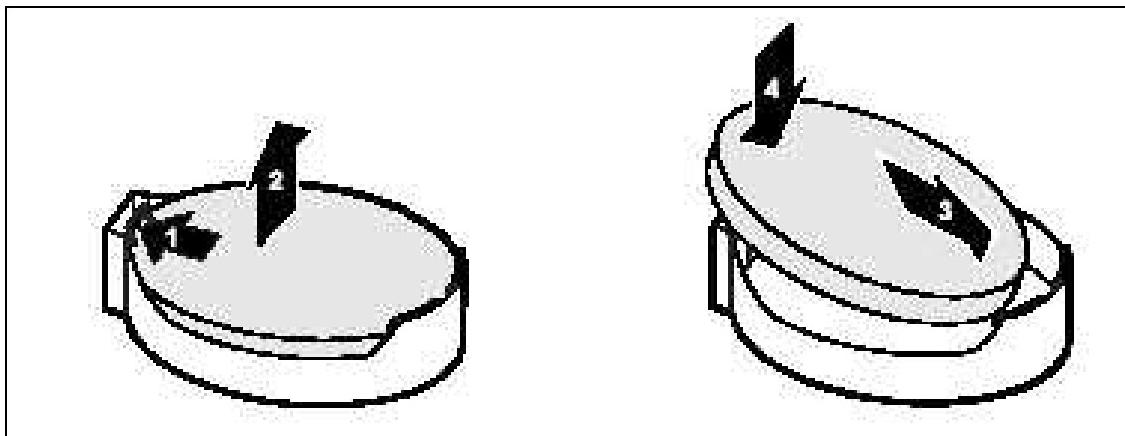


Fig. 56: Replacing the lithium battery

**NOTE**

In order to permanently save the system information, a lithium battery is installed to provide the CMOS memory with power. An appropriate error message notifies the user when the charge is too low or the battery is empty. The lithium battery must be replaced.

Incorrect replacement of the lithium battery may lead to a risk of explosion!

The lithium battery may be replaced only by an identical battery or a type recommended by the manufacturer.

Make sure that you insert the battery correctly. The plus pole must be on top!

Do not touch the minus pole of the battery with your finger. Use gloves or a cotton cloth to insert the battery.



1. Replace the PC from monitor trolley ([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Press the locking lug in the direction of the arrow ([1/Fig. 56 / p. 100](#)); the battery jumps slightly out of the holder ([2/Fig. 56 / p. 100](#)).
4. Remove the battery M420/ M430 ([Fig. 54 / p. 99](#)) or M450 ([Fig. 55 / p. 100](#)) and follow the "Disposal Instructions" for disposing of the old battery.
5. Push the new lithium battery of the identical type into the holder ([3/Fig. 56 / p. 100](#)) and press down on it until it engages ([4/Fig. 56 / p. 100](#)).
6. Reinstall the casing in reverse order.
7. Reinstall the PC in reverse order and reconnect the PC plugs (see ([Fig. 46 / p. 91](#))).

## Restoring BIOS settings (necessary after battery replacement)

**NOTE**

When the battery is empty, the BIOS is set to default and the first boot device is the CD-ROM drive.

In addition to activating the system ON/OFF switch, the following may be necessary ->

- Turn off the PC via the power switch on the rear panel of the PC.
- Turn on the PC via the rear power switch and press the button on the front panel of the PC.
- If the system is unintentionally switched off during BIOS installation, it may be necessary to press the reset key ([2/Fig. 45 / p. 90](#)) with a pin shaped object.

**NOTE**

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At this time, the BIOS settings can only be restored by performing the complete software installation procedure.

--> Perform software installation according to instruction SPR2-310.816.02...

---

## Replacing a PCI board PC M420 and M430 (e. g. CIPP board)

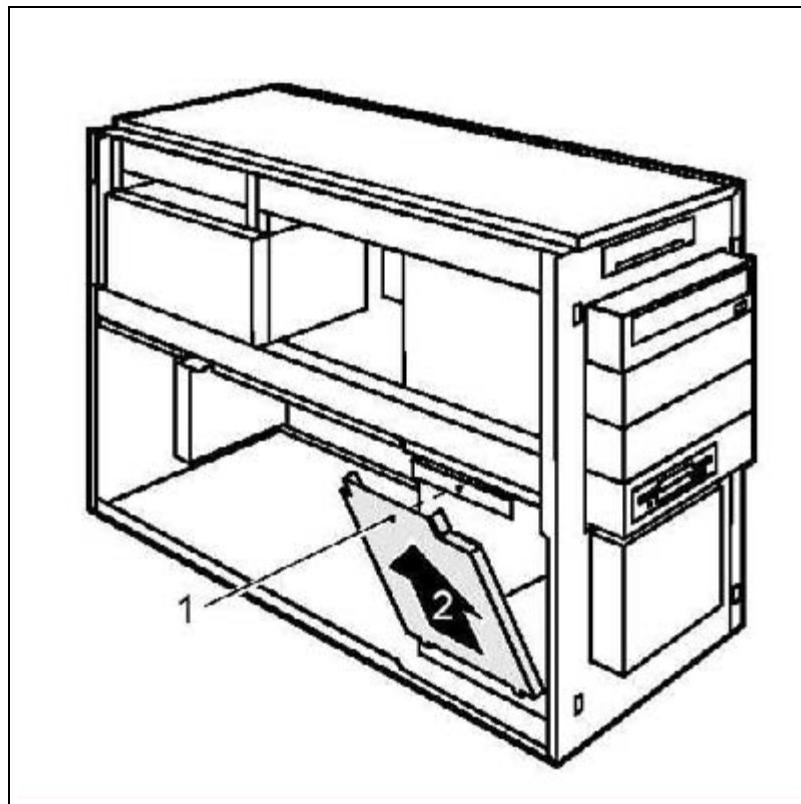


Fig. 57: *Replacing a PCI board\_1*

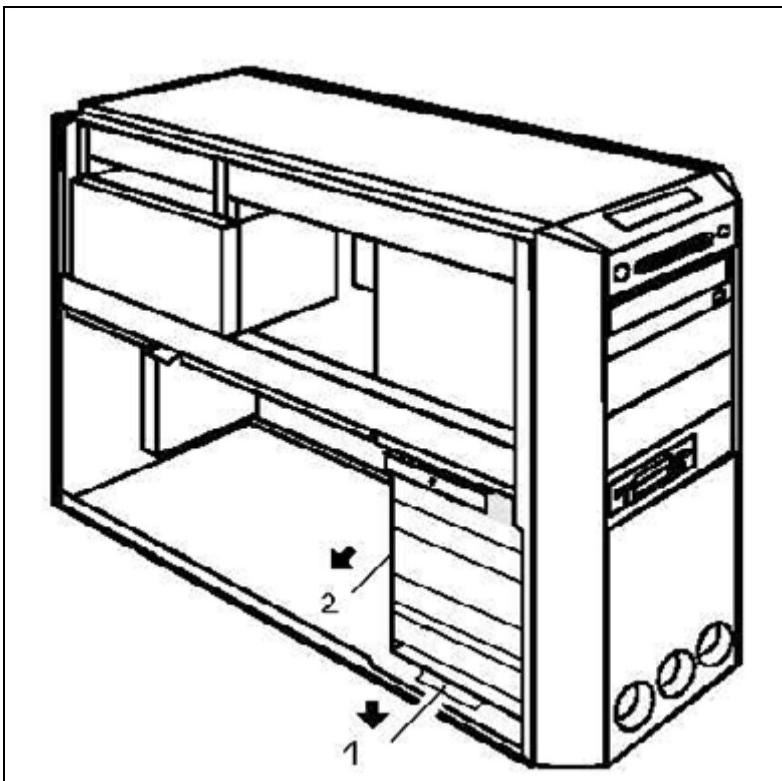


Fig. 58: Replacing a PCI board\_2

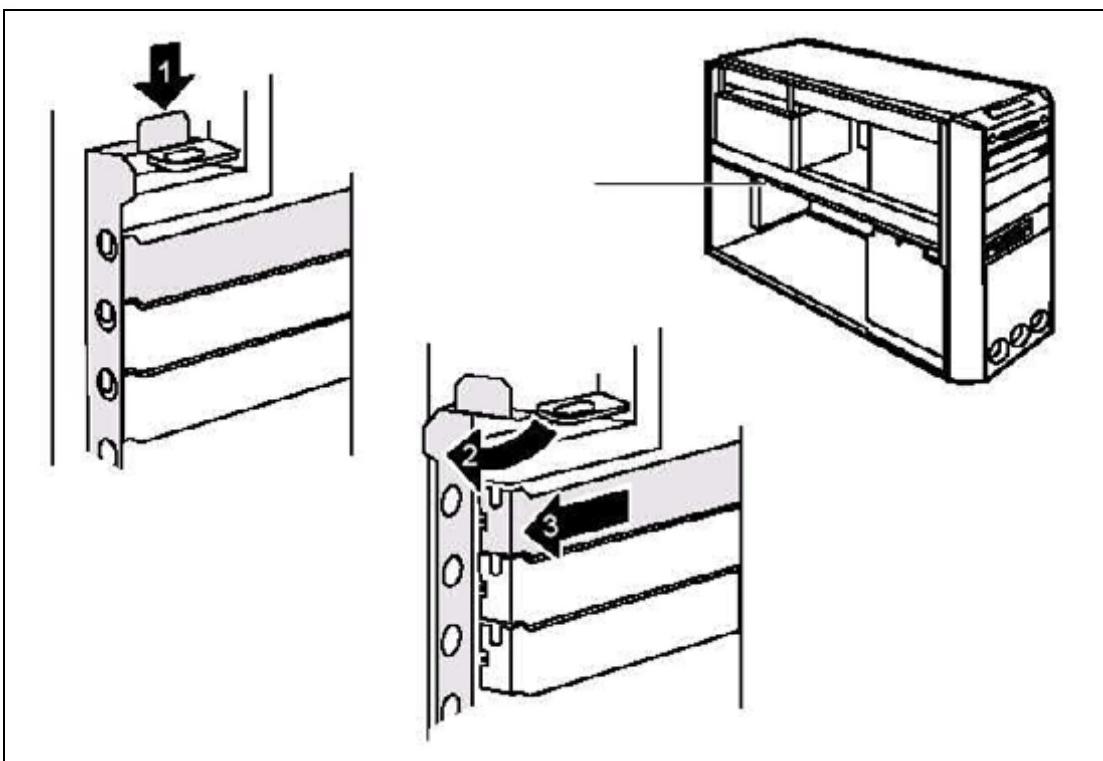


Fig. 59: Replacing a PCI board\_3

**NOTE**

Work steps 1 through 6 are only necessary for a long design of a PCI board (e.g. CIPP board) (see (Fig. 54 / p. 99))

See ARCADIS spare parts list for a list of the boards released for field exchange.



1. Replace the PC from monitor trolley (Replacing the PC / p. 91).
2. Open the casing (Opening the casing / p. 93).
3. Loosen the screw (1/Fig. 57 / p. 103).
4. Open up the cover (2/Fig. 57 / p. 103).
5. Disconnect the data and power supply cables to the hard disk drive.
6. Press the locking bar (1/Fig. 58 / p. 104) down and pull the hard drive casing (2/Fig. 58 / p. 104) out of the PC.
7. Press the unlocking mechanism (1/Fig. 59 / p. 104) down and open the locking rail (2/Fig. 59 / p. 104). The word "PRESS" is embossed on the unlocking mechanism.
8. Remove the locking screws from the relevant slot.
9. Disconnect the connectors from the PCI board.
10. Remove the board from the slot (3/Fig. 59 / p. 104).
11. Take the new board out of its packaging and install it in reverse order.
12. Reinstall the casing in reverse order.
13. Reinstall the PC in reverse order and reconnect the PC plugs (see (Fig. 46 / p. 91)).
14. Perform a functional test and an IQ Quick test.



**WARNING**

Once these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed and that the navigation system must be checked and certified before it is used again.

## Replacing a PCI board PC M450 (e. g. CIPP board)

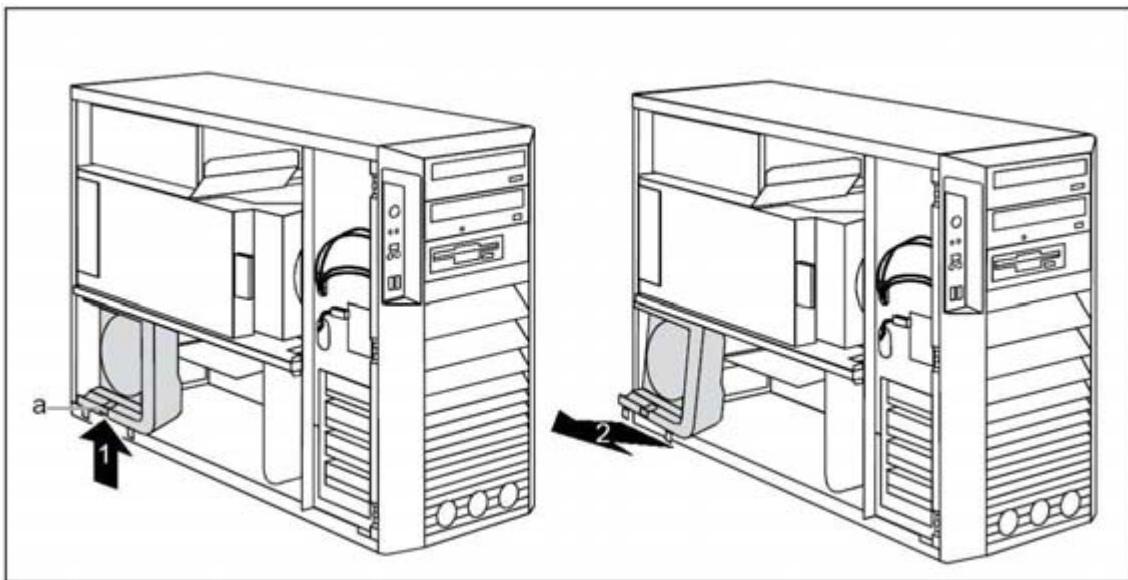


Fig. 60: Removing the side fan M450\_

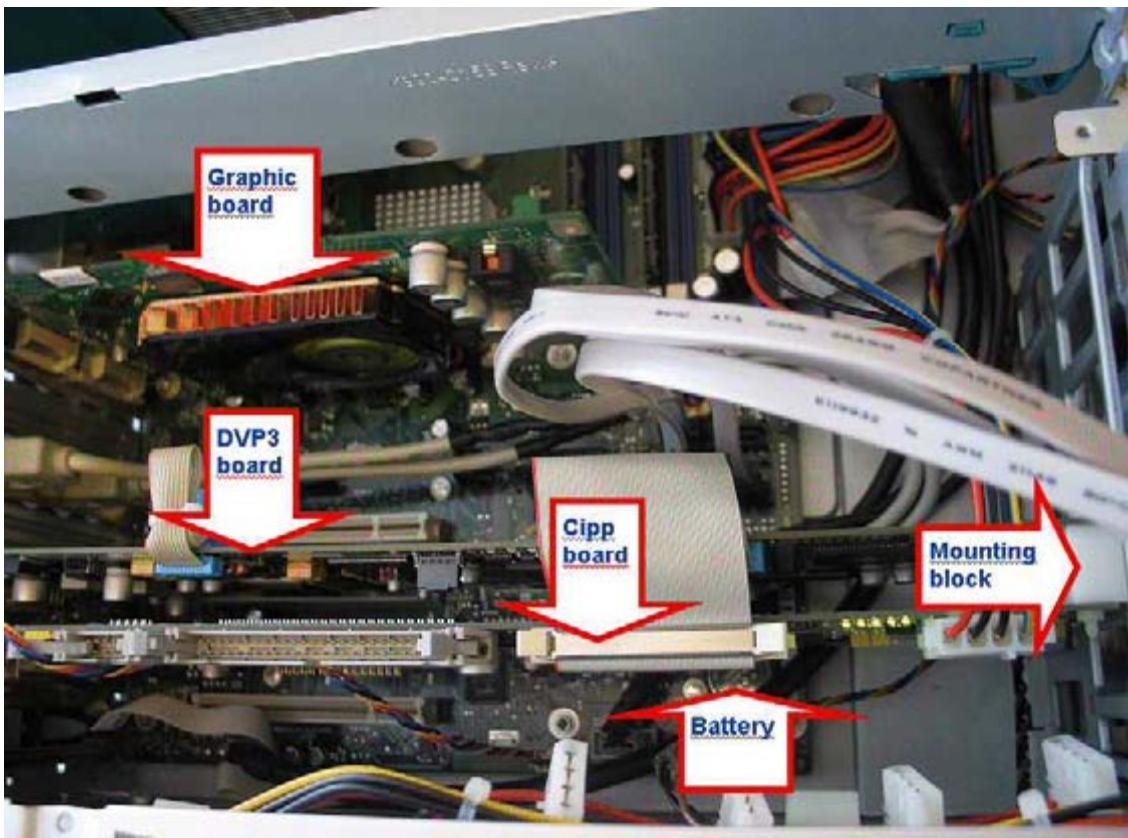


Fig. 61: Components M450\_

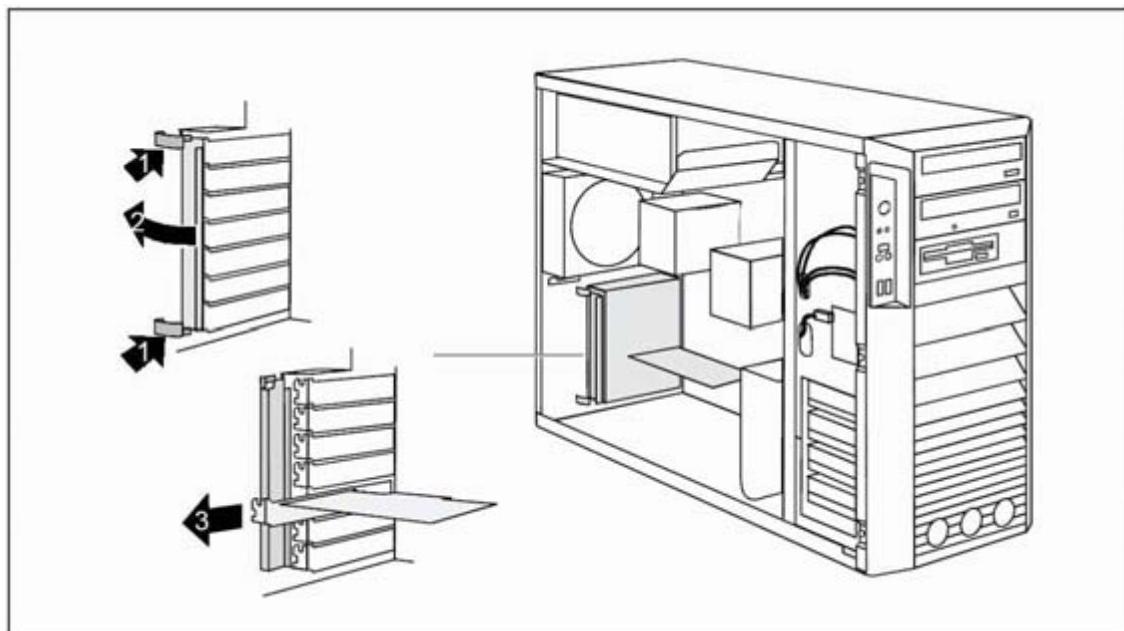


Fig. 62: Replacing a PCI board M450

1. Replace the PC from the monitor trolley ([Replacing the PC / p. 91](#)).
2. Open the casing ([Opening the casing / p. 93](#)).
3. Release the side fan by pressing the locking hook ((a/[Fig. 60 / p. 106](#)) in the direction of the arrow ([1/\[Fig. 60 / p. 106\]\(#\)](#)).
4. Pull the bottom edge of the side fan out of the casing ([2/\[Fig. 60 / p. 106\]\(#\)](#)) in the direction of the arrow.
5. Disconnect the fan cable from the mainboard and remove the side fan.
6. Remove the mounting block ([mounting block/\[Fig. 61 / p. 106\]\(#\)](#))
7. Press down on the clips ([1/\[Fig. 62 / p. 107\]\(#\)](#)) in the direction of the arrow and unhook them from the casing rear panel.
8. Open up the locking rail in the direction of the arrow ([2/\[Fig. 62 / p. 107\]\(#\)](#)).
9. Disconnect the connectors from the PCI board.
10. Remove the board from the slot ([3/\[Fig. 62 / p. 107\]\(#\)](#))
11. Take the new board out of its packaging and install it in reverse order.
12. Reinstall the casing in reverse order ([Fig. 47 / p. 93](#)).
13. Reinstall the PC in reverse order and reconnect the PC plugs (see ([Fig. 46 / p. 91](#))).
14. Perform a functional test and an IQ Quick test.

**⚠WARNING**

Once these service tasks have been performed, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed and that the navigation system must be checked and certified before it is used again.
-

## Replacing or installing a double USB slot PC M420 and M430 (optional for CAN converter)

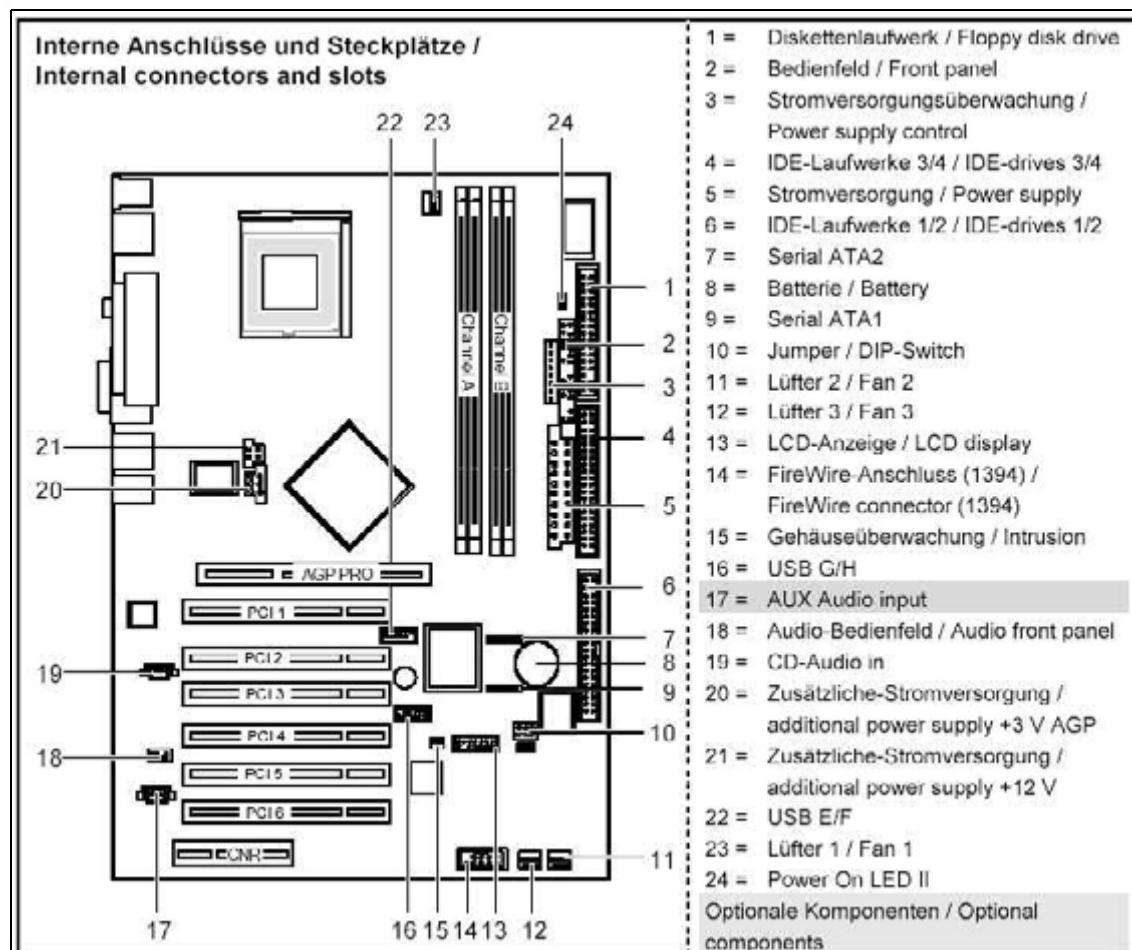


Fig. 63: Replacing or installing a double USB slot\_1



Fig. 64: Replacing or installing a double USB slot\_2

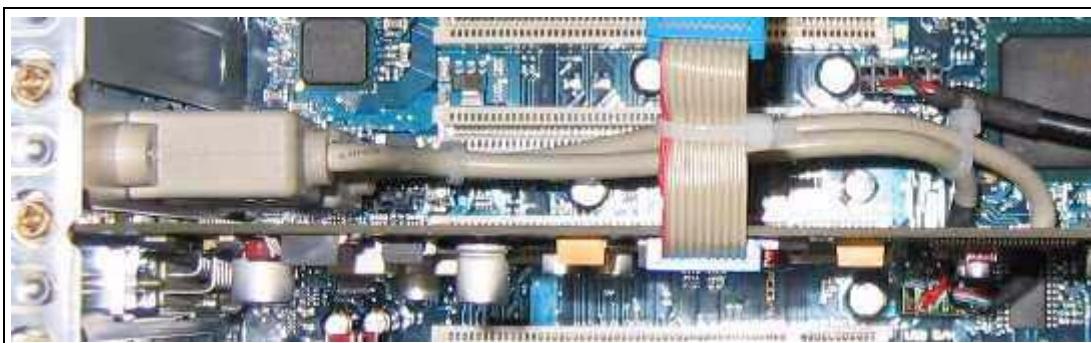


Fig. 65: Replacing or installing a double USB slot\_3

- 1. Open the casing ([Opening the casing / p. 93](#)).
- 2. Press the unlocking mechanism ([1/Fig. 59 / p. 104](#)) down and open the locking rail ([2/Fig. 59 / p. 104](#)). The word "PRESS" is embossed on the unlocking mechanism..

**NOTE**

**Slot 3 should be used for the double USB assembly.**

- 3. Replace the DVP3 board ([Fig. 54 / p. 99](#)) according to ([Replacing a PCI board PC M420 and M430 \(e. g. CIPP board\) / p. 103](#)).
- 4. Disconnect the USB G/H connector ([16/Fig. 63 / p. 109](#)) from the main board ([Fig. 63 / p. 109](#)).
- 5. Reinstall the double USB connector in the slot assembly.
- 6. Position and connect the USB cable as shown in ([Fig. 65 / p. 110](#)).

**NOTE**

The cable must be positioned as shown in Fig. (Fig. 64 / p. 110) and Fig. (Fig. 65 / p. 110).

**NOTE**

Make sure that the distance between the graphic board fan and the USB cable is fixed.

7. Reinstall the DVP3 board in reverse order.
8. Reinstall the casing in reverse order (Fig. 47 / p. 93).
9. Reinstall the PC in reverse order and reconnect the PC plugs (see (Fig. 46 / p. 91)).
10. Perform a functional test.

## Monitor trolley voltages

Secondary voltages for the line voltage; table 1.

Voltage for..	Test point	Voltage	Comments
Generator	X3.1 -- X3.2	200 V ~ to 215 V ~	To main system
Generator	X3.5 -- X3.6	230 V ~ to 246 V ~	To main system
ASPIA PC, live monitor	X11.1 -- x11.4	230 V ~ to 246 V ~	From UPS output
Reference monitor, Paper printer	X2.1 -- X2.2	230 V ~ to 246 V ~	Paper printer = option
UPS input	X4.2 -- X4.3	230 V ~ to 246 V ~	Supply voltage

## Main system voltages

Operating voltages; table 2.

Voltage	Tolerance	Test point	Potentiometer	LED
+5V	+0.2 V	D1 TP Vcc -- D1 TP ⊥ D	M14. +5 V/adj.	V80
+15V	± 0.1 V	D1 TP +15V -- D1 TP ⊥ A	M14. +15 V/adj.	n.a.
-15V	± 0.5 V	D1 TP -15V -- D1 TP ⊥ A	M14. -15 V/adj.	n.a.
+13V	± 0.2 V	M13 +13V -- M13 GND	n.a.	n.a.
+27V	-0.5 V	D3X3.2 -- D3 X3.3	n.a.	n.a.
+24V	+5.5V	D3X1.9 -- D3 X1.7	n.a.	n.a.
200V~	+15V	Generator line filter Z1.3 -- Z1.4	n.a.	n.a.
230V~	+16V	M14 N.2 -- M14 N.1	n.a.	n.a.

## I.I. voltages

**NOTE**

The needed electrode voltages of the I.I. are printed in the I.I. test certificate 1, delivered with the I.I.

### Roederstein I.I. mini voltage supply

The E1/E2/E3 and A voltages may be taken from the I.I. test protocol and checked or adjusted on the basis of the control test points listed in table 3.

Voltage	Test point	Ground point (0V)	Potentiometer for full format	Potentiometer for zoom format	Voltage divider ratio
E1	UE1	⊥	P10	P11	1:1
E2	UE2	⊥	P6	P7	1:1
E3	UI 15	⊥	P2	P3	1:10000
30 kV, anode	UI 30	⊥	P1	P1	1:10000

**⚠WARNING**

After the electrode voltages are adjusted, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.

### Spellman I.I. mini voltage supply

The E1/E2/E3 and A voltages may be taken from the I.I. test protocol and checked or adjusted on the basis of the control test points listed in table 3.

Tab. 1 Test points and voltage divider ratio

Voltage	Test point	Test point Ground (0V)	Voltage divider ratio
E1	TP1	TP G	1:100
E2	TP2	TP G	1:200

Voltage	Test point	Test point Ground (0V)	Voltage divider ratio
E3	TP3	TP G	1:3333
Penning	TP P	TP G	1:1000
Anode	TP A	TP G	1:10000

### Adjustment

Tab. 2 DIP switches

DIP Switches	1	2	3	4
Normal status	ON	OFF	OFF	OFF
Adjustment E1 (U1)	ON	OFF	ON	OFF
Adjustment E2 (U2)	ON	ON	OFF	OFF
Adjustment E3 (U3)	ON	ON	ON	OFF

**NOTE**
**DIP switch 1:**

Pos. OFF = 25kV anode voltage, not adjustable Pos. ON = 30 kV anode voltage, not adjustable.

For the ARCADIS I.I. types, dip switch 1 must always be set to the position “ON” (= 30 kV anode voltage).

1. Before performing the voltage adjustment for one of the electrodes, set the corresponding DIP switches to the position described in the “DIP switches”table and connect a digital multimeter to the correct test points, described in the "Test points and voltage divider ratio" table.
2. According to the activated DIP switch, adjust the E1, E2 or E3 value by using the “Adjustment” potentiometer .
3. After the correct voltage is adjusted, switch off the corresponding DIP switches.
  - ⇒ The adjusted voltage value for this electrode is stored.
- If needed, set the DIP switches for the next electrode adjustment and adjust the next electrode voltage.
- If needed, select the next I.I. zoom format and repeat the voltage adjustments for the electrodes E, E2 and E3 for the I.I. zoom format.

**⚠WARNING**

After the electrode voltages are adjusted, the accuracy of an optionally installed navigation system is no longer guaranteed.

See the chapter "Prerequisites," section "Safety information and protective measures."

- ⇒ If an optionally installed navigation system is present, the customer must be notified that the accuracy of the installed navigation system is no longer guaranteed, and that the navigation system must be checked and certified before it is used again.
-

## Brake force/brake torque

### Measuring the horizontal force required for movement

The attachment point for the spring scale is the end of the railing near the image intensifier in sector B and/or the handgrip of the horizontal carriage. The carriage must always be pulled at a constant speed.

- ⇒ The maximum force for moving the horizontal carriage consistently when the brakes are released is 80 N.
- ⇒ When the brakes are applied, the force must be > 180 N.

Measurement A-C: At the handgrip of the horizontal unit, the measuring points move to 30, 170 and 200 mm

Measurement C-A: At the railing near the image intensifier, the measuring points move to 30, 170 and 200 mm

### Measuring the horizontal swivel force

- ⇒ The swivel force when the brakes are released is max. 35 Nm.
- ⇒ Swivel force when brakes are applied > 100 Nm.

### Measuring the orbital force required for movement

The attachment point for the spring scale is the end of the railing near the image intensifier in sector B. The carriage must always be pulled along the C-arm at a constant speed.

#### Movement when brakes are released

- ⇒ C-arm in vertical position, the force used to move the C-arm consistently must not exceed 80 N.
- ⇒ C-arm in horizontal position, the force used to move the C-arm consistently must not exceed 90 N.
- ⇒ When brakes are applied, the force required for movement when the C-arm is in the vertical position is > 100 Nm.

Measurement A-C: Start at 90° (I.I.), pull spring scale to -90° (SIREPHOS)

The C-arm opening faces downward at the start of the measurement

Measurement C-A: Start at -90° (SIREPHOS), pull spring scale to 90° (I.I.)

The C-arm opening faces downward at the start of the measurement

## Measuring the angular force required for movement

The attachment point for the measurement is the railing next to the image intensifier, where the C-arm has an orbital position of 0° and an angulation of 0°.

- ⇒ When the brakes are released, the force required for movement is between 20 and 30 N.
- ⇒ When the brakes are applied, the force required for movement must exceed 100 N in order to move the C-arm.

## Supplement, measuring the tube current

### NOTE

**When measuring the tube current, the distribution current must be derived from the measured value. The distribution current depends on the kV and is calculated according to Ohm's law. The distribution resistance is 400 MΩ.**

1. Switch the system OFF.
2. Remove jumper X97 from board D1.
3. Connect the mA measuring device at D1.X39 and D1.X40.
4. Switch the system ON.
5. Release radiation and read the overall current.
6. Read out the kV value produced while the current is being measured.



Calculate the tube current as follows:

high voltage [kV]

$$\text{tube current [mA]} = \text{overall current [mA]} - \frac{\text{high voltage [kV]}}{\text{distribution resistance [MOhm]}}$$

e.g.:

At 110 kV, an overall current of 5.275 mA is measured.

110 [kV]

$$\text{tube current [mA]} = 5.275 \text{ [mA]} - \frac{110 \text{ [kV]}}{400 \text{ [MOhm]}} = 5.275 \text{ [mA]} - 0.275 \text{ [mA]} = 5.0 \text{ [mA]}$$

Section replacement of “Replacing the power supply assembly”.

